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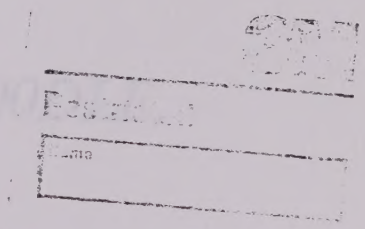
# Instruction Manual

3M

*573DL*
*573DLE*
*500DL*
*500DLE*
*2220L and*
*4420L*

*Maintenance Manual (Level II)*



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*Revision A*

Telecom Systems Group

# Dynatel™

# *573DL, 573DLE, 500DL, 500DLE, 2220L, and 4420L*

*Maintenance Manual*

*(Level II)*

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*This manual has been prepared by 3M Dynatel Systems to provide the most important written material to date for the 573DL, 573DLE, 500DL, 500DLE, 2220L, and the 4420L products. It assumes a basic understanding of electronic terms to the technical level of an associate degree in electronics engineering or a vocational college graduate.*

*Whenever this manual is reissued the reason(s) for reissue will be listed here.*

*Comments concerning the contents or organization of this document, as well as suggestions for improvement are welcomed. Direct comments to:*

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# Description

## 1. SYSTEM COMPONENTS

**1.1** This manual covers six different models which are divided into two major categories: units that are both cable and fault locators, and units that are cable locators only. From a hardware point of view, all models are the same with the exception that the cable locators do not have the necessary circuitry for fault location. The system (either category) consists of a receiver, an external antenna, a transmitter and the following standard accessories.

- Direct Connect Cable
- Ground Rod
- Ground Extension Cable
- Short Antenna Connecting Cable
- Batteries
- 3-inch Dyna-Coupler
- Dyna-Coupler Extension Cable
- Earth Contact Frame (573DL, 573DLE, and 4420L only)
- Earth Frame Cable (573DL, 573DLE, and 4420L only)

### A. Transmitter

**1.2** The transmitter provides a signal source compatible with the receiver trace mode. You can select either one or two of the four possible frequencies choices, and you can select one of two output signal levels, Normal or High. You can apply the signal source either through direct connection, a Dyna-Coupler, or induced from an internal antenna. The induction mode is automatically selected unless the direct connect cable or Dyna-Coupler cable is plugged into the transmitter output jack.

**1.3** The transmitter also provides a dual frequency signal source for use with the receiver's sheath fault mode (573DL, 573DLE, and 4420L only). The frequencies are not user selectable and are set at the factory. You can, however, select one of the four trace signal frequencies to allow cable tracing and sheath fault locating. This signal source may be applied only by direct connection.

**1.4** The transmitter provides a signal source used with the receiver toning mode. The frequency is not user selectable and is set at the factory to 577.5 Hz for countries with 60 Hz power or to 481.25 Hz for countries with 50 Hz power. You can select one of two output levels, Normal or High. This signal source may be applied only by direct connection.

**1.5** You can use the transmitter to measure resistance of the circuit attached to the direct connect leads. The measurement range is from 0 to 10 megohms (log scale) in the absence of foreign voltage. You can use this function to determine the presence of a sheath/conductor fault or far-end ground.

**1.6** You can also use the transmitter to measure the voltage present at the direct connect leads. The measurement range is from 0 to 250 volts AC or DC. This function alerts you to the presence of foreign voltage on a circuit.

**1.7** The transmitter is powered by six (6) 'D' size Alkaline or rechargeable Ni-Cd batteries. The unit has an internal battery charger which requires an external 12 volt DC source (charger transformer or car battery). The transmitter design includes a battery test function that provides a battery status indication and an automatic 'power off' when the batteries are too low, to prevent permanent damage to the batteries.

**1.8** The transmitter, which is microprocessor controlled, performs a limited self-test when powered up. These tests include the LCD, power supply and signal generation circuits.

**1.9** The transmitter user interface is a custom Liquid Crystal Display (LCD) and an eight key keyboard.

**1.10** The transmitter emits a continuous low-level interrupted beep to indicate power-on status.

**1.11** The transmitter consists of the following parts.

- Case
- Hinged Lid
- Control Panel
- Battery Compartment
- Stowage Area for Receiver and Accessories
- Shoulder Strap Retainers

**1.12** Figure 1 is a detailed view of the transmitter Control Panel. Each item functions as follows.

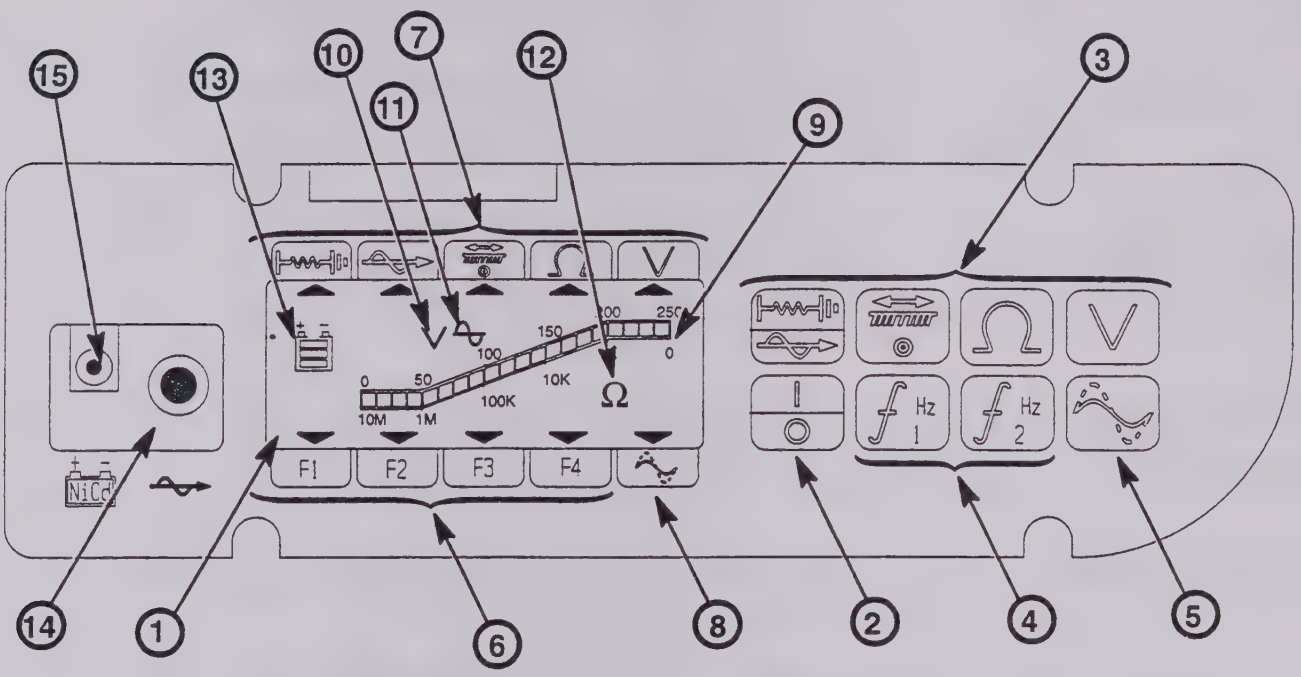



**Figure 1 Transmitter Control Panel**

① **Liquid Crystal Display (LCD):** The LCD provides visual indications about the mode of operation, Frequency, Voltage and Ohms measurements, output level, and battery status.

② **On/Off Key** [I/O]**:** Turns Transmitter power on or off, when pressed. The Transmitter defaults to the [V] (volts) mode when power is first turned on. The Transmitter beeps every four seconds when power is on.

③ **Mode Select Keys:** Allow you to select one of five modes of operation.

- Buried Fault/Tone [ ],
- Trace [ ],
- Ohms measurements [Ω], and
- Voltage measurements [V].

④ **Frequency 1 ([f Hz 1]) and Frequency 2 ([f Hz 2]) Keys:** Used to select the frequency of the tracing signals. Press these keys to step the Transmitter through four possible selections. In [ ] (trace) mode, you can apply two frequencies to the conductor simultaneously; the

first being selected by [f Hz 1] and the second by [f Hz 2]. In [fault] (fault) mode, [f Hz 1] selects a tracing frequency. In [tone] (tone) mode [f Hz 1] is inoperative, but pressing [f Hz 2] causes the 577.5 Hz tone to become interrupted.

⑤ **Output Level Key** [output]: Used to alternately select either high or normal output power. This key functions in [trace] (trace), [fault] (fault), or [tone] (tone) modes.

⑥ **Selected Frequency Indicators** [F1] [F2] [F3] [F4]: These legends show the four possible frequency selections. A flag (▼) appears above the selected frequency. A flashing (on and off) flag indicates that you have selected a frequency which is not allowed (such as the low frequency when using the induction method).

⑦ **Mode Select Indicators:** These legends show the five possible modes of operation: [fault] (fault), [tone] (tone), [peak] (peak), [null] (null), [differential] (differential). The LCD flags below them (▲) indicate the mode selected. You can select only one mode at a time.

⑧ **Output Level Indicator** [output]: If you select high power output, the LCD flag above the legend is visible. Otherwise, normal power output is selected.

⑨ **Bar Graph Indicator:** A twenty-segment bar with numeric legends above and below. In [trace] (trace), [fault] (fault), or [tone] (tone) modes, the upper and lower numeric legends are not visible and the bar graph indicates the relative magnitude of the Transmitter signal. In [Ω] (ohms) mode, the lower numeric legend is visible and the bar graph reads resistance. In [V] (volts) mode, only the upper numeric legend is visible and the bar graph reads either AC or DC volts.

⑩ **Voltmeter Mode Symbol V:** This symbol is visible when the bar graph displays measured voltage.

⑪ **Output Mode Symbol** [output]: This indicator is visible when the bar graph displays relative output signal level.

⑫ **Ohmmeter Mode Symbol Ω:** This indicator is visible when the bar graph displays measured resistance.

⑬ **Battery Level Indicator** [battery]: This symbol contains three horizontal bars that indicate relative remaining capacity of the batteries. If all three bars are visible the batteries are good. When the two lower bars are visible, alkaline batteries are good but Ni-Cd batteries are starting to get low. When only the lower bar is visible, alkaline batteries are getting low but they will probably finish the job. Ni-Cd batteries are low and should be used only on short jobs. They should be re-charged soon. If no bars are visible, Ni-Cd batteries need to be charged and alkaline batteries need to be replaced. The battery level indicator is continuously displayed.

⑭ **Input/Output Jack** : Input and output signals are connected here using the Direct Connect Cable or a Dyna-Coupler Extension Cable. In [Ω] (ohms) or [V] (volts) modes, the measurement is made through the Direct Connect Cable plugged into this jack. With the plug removed and the Transmitter in [TRACE] (trace) mode, the internal induction coil is energized.

⑮ **Battery Charger Jack** : The external battery charging accessory is connected to the Transmitter through this jack. The Transmitter may be operated from 12 VDC supplied by an automotive battery. The voltage is applied to the Transmitter through the battery charger jack using the 12-volt automobile adapters.

## B. Receiver

**1.13** All models use the same basic receiver assembly but the 573DL, 573DLE, and 4420L receivers contain one additional circuit board (sheath fault PCB). The 500DL, 500DLE, and 2220L receivers do not have a Keyboard/Display overlay that includes the Sheath Fault/Tone legends. The receiver antenna assembly is identical for all models. The receiver has been designed for use in three possible configurations. With the antenna attached, you can use the receiver as a single hand-held unit. With the antenna detached, you can hold the antenna in one hand and the receiver in the other. Also, you can hang the receiver by your side using the optional shoulder strap attached to the receiver. The receiver and standard accessories stow within the transmitter case. The receiver provides the following features.

1. Trace Mode: The receiver allows you to select one of four active trace frequencies (signal frequencies produced by the transmitter) or one of two passive trace frequencies (power harmonics or a radio frequency signal produced by a commercial/military transmitter). The four active trace and one RF passive trace frequencies are in the range of 577 Hz to 200K Hz. The passive POWER trace frequency is the ninth harmonic of either 50 Hz or 60 Hz (450 Hz or 540 Hz.

2. Tone Mode (573DL, 573DLE, and 4420L only): The frequency used by the tone receiver is not user selectable. It is set at the factory to 577.5 Hz for countries with 60 Hz power or to 481.25 Hz for countries with 50 Hz power.

3. Trace Operating Modes: The receiver trace mode offers four options, PEAK, NULL DIFF (Differential), and SPECIAL PEAK. An expander function can be applied to all trace options. In the PEAK and SPECIAL PEAK modes, the receiver audio output (if enabled) and visual strength indicators (bar graph display and numeric display) increase to a maximum as the receiver antenna (perpendicular to the ground) is moved toward a position directly over the underground cable (signal source). With the expander function selected, the resolution of the bar graph display is increased and the audio is cut out when the signal strength indication drops below a threshold value. PEAK mode uses a dual (upper and lower) antenna coil arrangement to provide a sharp peak response. SPECIAL PEAK mode uses only the lower antenna coil which being closer to the signal source will allow operation when the underground cable is buried deeply. In the NULL mode the receiver audio (if enabled) and numeric strength indicator decrease to a minimum as the receiver antenna is moved toward a position directly over the under-

ground cable while the bar graph indicator increases to a maximum. With the expander function selected, the resolution of the bar graph display is increased and the audio is cut out when the signal strength indication drops below a threshold value. In the differential mode (DIFF) the receiver provides an indication of the relative position of the cable with respect to the receiver with Left-Right arrows on the display. This mode incorporates a unique four-antenna algorithm to determine proximity to and position with respect to the underground cable. The bar graph and numeric strength indicators increase to a maximum as the receiver antenna is moved toward a position directly over the underground cable. The receiver produces a continuous tone when the receiver antenna is directly over the cable. The receiver produces a two different warbling tones that indicates the antenna is to the left or right of the cable. With the expander function selected, the resolution of the bar graph display is increased.

4. Fault/Tone Operating Modes (573DL, 573DLE, and 4420L only): In the Fault mode, you can trace and pinpoint the location of faults in a cable sheath which causes current to flow from the internal shield to the earth. With the earth contact frame attached to the receiver, you probe the earth. The receiver provides a bar graph indication which is either the left side of the bar graph or the right side depending on the orientation of the earth frame with respect to the sheath fault (the bar graph matches the labeling on the legs of the earth contact frame – either red or green). The numeric indicator provides a measure of the relative strength of the received signal. The received signal is audible in the receiver speaker (if audio is enabled). The expander function is not selectable in this mode. The dual-frequencies used by the sheath fault receiver are not user selectable; they are set at the factory.

5. With a toning coil attached to the receiver and the Tone mode selected, you can pinpoint conductor or sheath faults in aerial cables. The numeric strength indicator, bar graph indicator and audio output provides a measure of the received signal strength. With the expander function selected, the resolution of the bar graph display is increased and the audio signal is cut out when the received signal strength drops below a set level.

6. Depth Estimation: The receiver provides an estimation of the underground cable depth on demand when in any of the four Trace modes. When you have positioned the antenna over the underground cable, place the antenna on the ground and press the depth key. The resulting depth estimation is displayed in feet and inches (573DLE, and 500DLE are in centimeters). Depth information remains displayed until the depth key is pressed again. The depth function is disabled in the Fault/Tone modes.

7. Audio Output: You can select one of four audio output levels, OFF, LOW, MEDIUM and HIGH. The test set displays the currently selected output level.

8. Headset: A monophonic headset connector is provided on the receiver for use in high ambient noise areas.

9. Power Source: The receiver is powered by five (5) 'C' size alkaline or rechargeable Ni-Cd batteries. The unit has an internal battery charger which requires an external 12 volt DC source (charger transformer or car battery). The receiver includes a battery test function that provides a battery status indication to you and an automatic 'power off' when batteries are low, to prevent permanent damage to the batteries.

10. Built-In Tests: The receiver is microprocessor controlled and performs a limited self-test when powered up. These tests include the LCD, receiver and audio path.

11. Receiver User Interface: The user interface consists of a custom Liquid Crystal Display (LCD) and an eight key keyboard. The LCD has no language-dependent text.

**1.14** The receiver consists of the following parts.

- Case
- User Interface (Keyboard/Display)
- Connector Panel
- Audio Speaker
- Battery Compartment
- Handle
- Antenna Mount Recess
- Connector Recess Cover

**1.15** Figure 2 is a detailed view of the receiver control panel. Each item functions as follows.

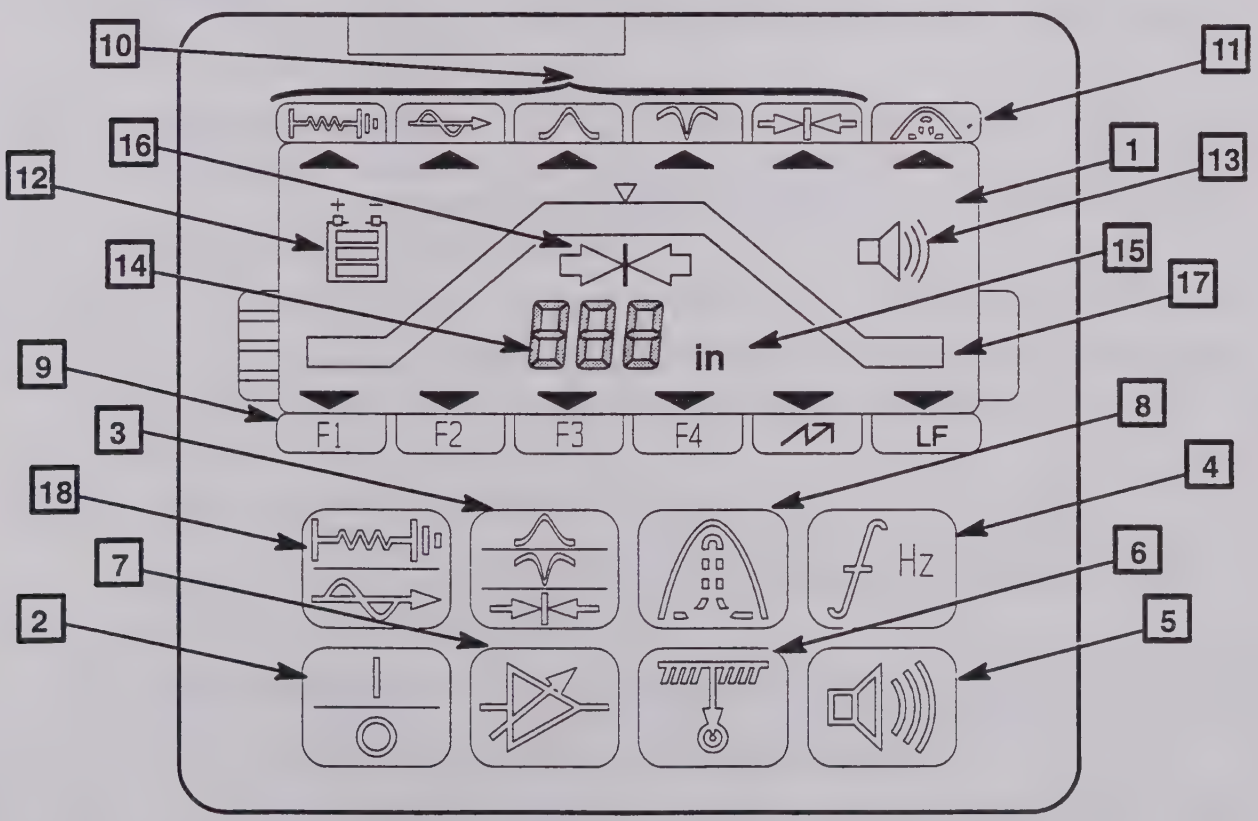
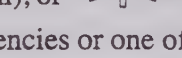



**Figure 2 Receiver Control Panel**

1 **Liquid Crystal Display (LCD):** The LCD provides visual indications about mode of operation, frequency, measurement results, volume level and battery status.

2 **On/Off Key** : Turns Receiver power on or off when pressed. Any user-selected modes, frequencies, or functions are saved when power is turned off and is the same when power is turned on. The Receiver automatically turns itself off after 30 minutes if no keys are pressed or connections made to the connector panel.

3 Trace Mode Select Key : Used to trace a buried cable in one of three modes: (peak), (null), or (differential). Pressing this key deselects a previously-selected (fault) or (tone) mode.

4 **Frequency Key** : Used in either (peak), (null), or  (differential) selections of trace mode to select one of the four active frequencies or one of the two passive frequencies. Each keypress advances to the next sequential frequency. This key does not function in (fault) or (tone) modes.

5 **Volume Key** : Used to sequentially select one of the four speaker audio levels; off, low, medium, or high.

6 **Depth Key** : Used to obtain a depth measurement to a buried cable. This key enables or disables depth and current calculations. This key only functions in the trace modes and only with the Antenna attached.

7 **Gain Adjust Key** : In (peak), (null), or (differential) modes, pressing this key adjusts the sensitivity of the Receiver up or down to maintain a satisfactory signal level. In the (differential) or (fault) modes, the unit automatically adjusts sensitivity and this key does not function.

8 **Expander Key** : In (peak), (null), (differential), or (tone) modes, this key enables or disables the expander function. The (expander) makes peaks or nulls more pronounced and enhances the amplitude difference between two conductors carrying the same tone.

9 **Selected Frequency Indicators:** These legends show the four active ( , , and ) and two passive frequencies ( power and low frequency) that you can select in the trace modes. A flag ( ) appears above the selected frequency. You can select only one frequency at a time.

10 **Mode Select Indicators:** These legends show the five modes of operation (fault), (tone), (peak), (null), (differential). A flag ( ) appears below the selected mode. You can select only one mode at a time.

11 **Expander Select Indicator** : When the LCD flag below this legend is visible, the expander function is on.

12 **Battery Level Indicator** : This symbol contains three horizontal bars that indicate relative remaining capacity of the batteries. If all three bars are visible the batteries are good. When the two lower bars are visible, alkaline batteries are good but Ni-Cd batteries are starting to get low. When only the lower bar is visible alkaline batteries are getting low but will probably finish the job. Ni-Cd batteries are low and should be used only on short jobs. They should be re-charged soon. If no bars are visible, Ni-Cd batteries need to be charged and alkaline batteries need to be replaced. The battery level indicator is continuously displayed.

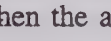
13 **Audio Level Indicator** : When the speaker symbol with arcs representing sound waves is visible, audio is selected. The number of 'sound waves' in front of the speaker indicate the level is set to low, medium or high.

14 **Numeric Display:** The three-digit numeric display continuously displays the relative received signal strength in all modes unless (depth) is pressed. Then depth to the buried cable is displayed in feet and inches.

15 **Depth Measurement Units:** The 'in' (inches) indicator is visible only during depth display.

16 **Left-Right indicators** : These indicators are visible only in (differential) mode. In this mode, the arrows point toward the cable.

17 **Bar Graph Indicator:** This indicator shows the nearness to a position directly over a buried conductor. The method of indication depends on the mode of operation described as follows.

a. **Trace Modes** ( peak, null, or  differential): When the antenna is directly over the buried conductor, all or nearly all (depending on the signal strength) of the segments of the bar graph are visible. When the antenna is either right or left of the conductor path, the bar graph begins to separate at the middle. As the antenna is moved farther from the cable, fewer and fewer of the middle segments are visible (refer to Figure 3).

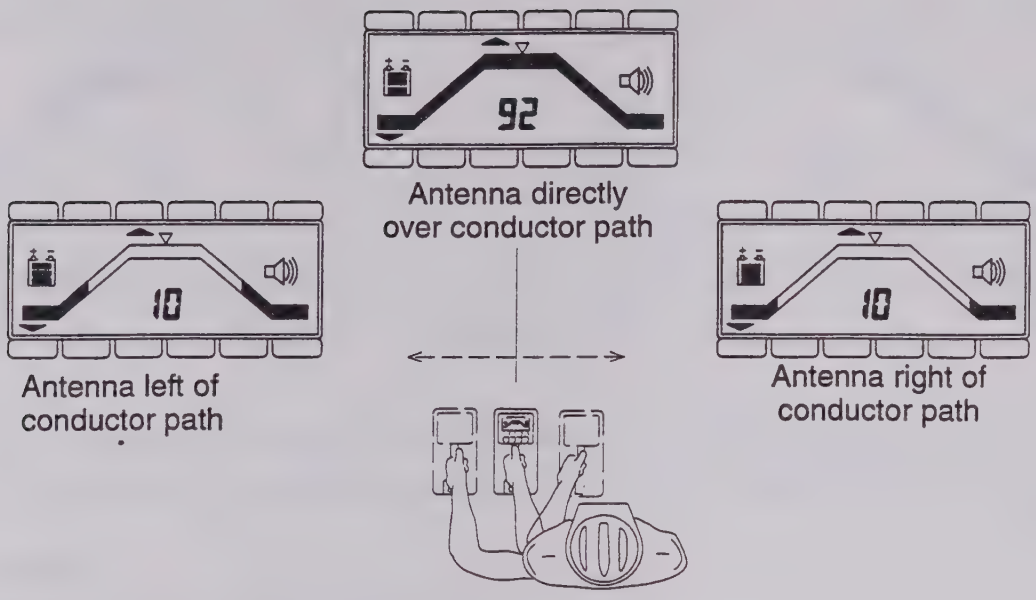
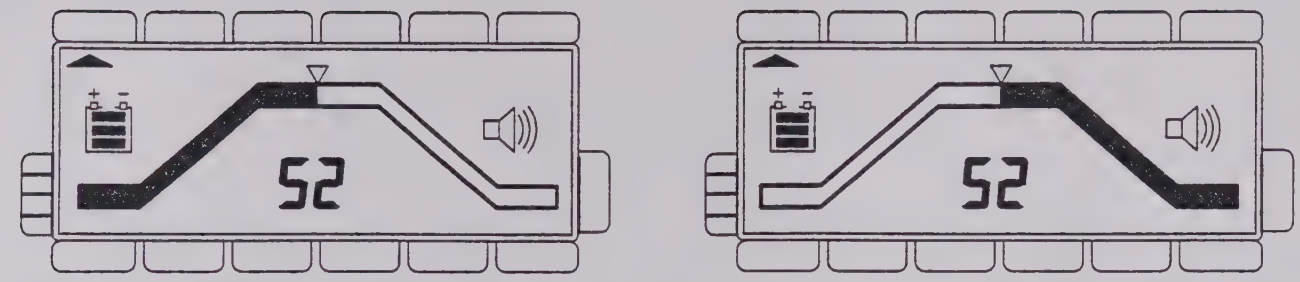



**Figure 3 Bar Graphs in Trace Modes**

b. **Current Measurement**: The bar graph indicates the magnitude of tone current in the buried conductor. When you press (depth) over a conductor with a relatively high current, all or nearly all of the segments of the bar graph are visible. Conductors with less current cause the bar graph to separate at the middle. This feature is useful when two nearby conductors are both carrying tone. The conductor with the greatest current is easily identified.

c. **Tone Mode** : Bar graph response is similar to the trace modes. It indicates signal strength; the more tone signal, the more segments visible.

d. **Fault Mode** : The bar graph indicates the orientation of the earth contact frame to a buried fault. If the red (striped) leg of the earth contact frame is closer to the fault, the left half of the bar graph is visible. If the green (solid) leg of the earth contact frame is closer, the right half of the bar graph is visible. Two markings on each side of the display correspond to the markings on the earth contact frame. Refer to Figure 4.




Fault towards striped leg of earth frame

Fault towards solid leg of earth frame

**Figure 4 Bar Graphs in Fault Mode**

18 **Fault/Tone Mode Select Key** : Used to select (sheath fault) mode or (tone) mode. Pressing this key deselects a previously selected (trace) mode.

## C. Antenna

**1.16** The antenna consists of the following parts.

- Antenna case
- Handle
- Antenna Output Connector

**1.17** When the antenna is used separately from the receiver, the handle latches in the highest position. When the antenna is attached to the receiver, the handle acts as part of the antenna-to-receiver latching mechanism.

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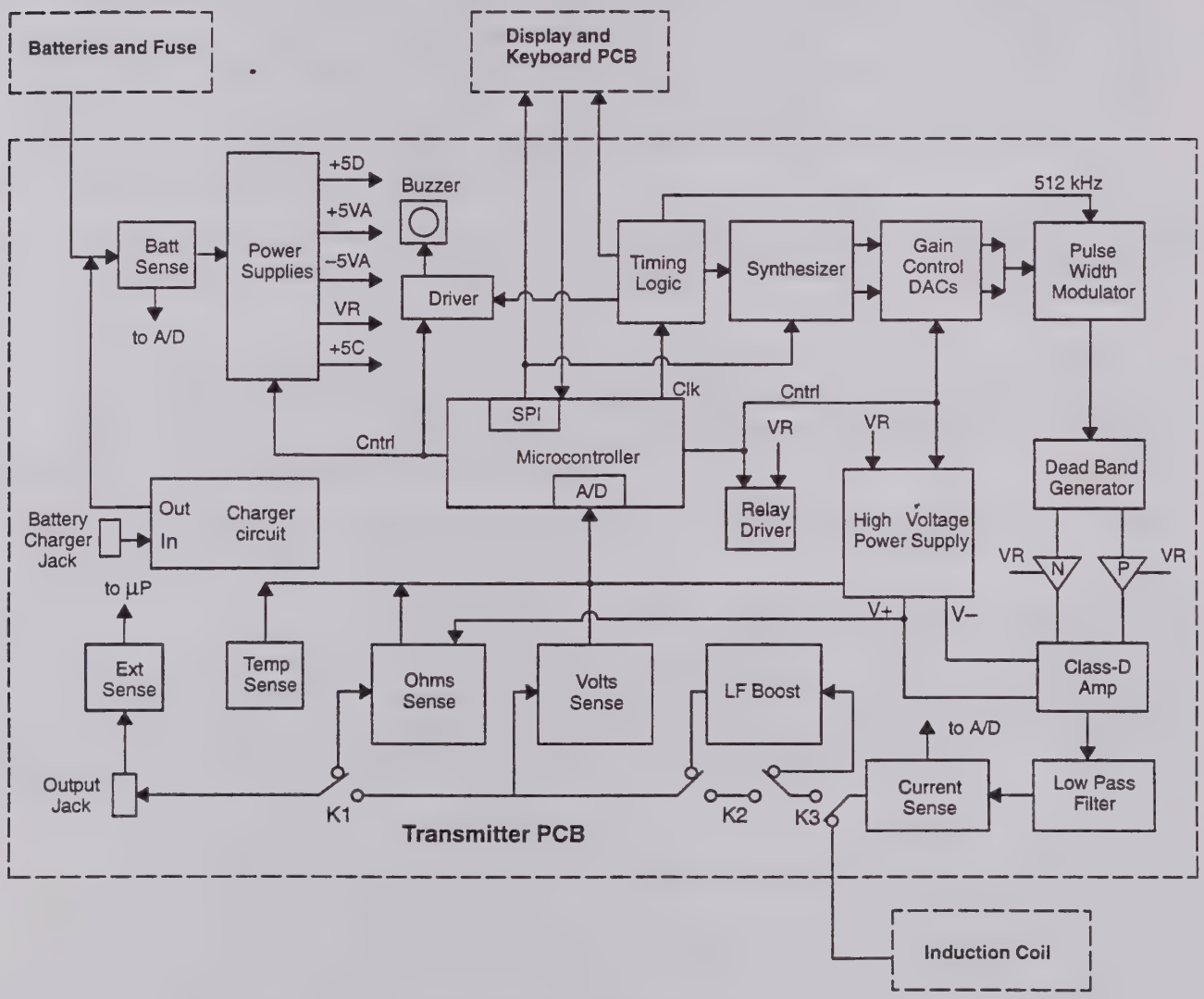
# Operation

## 1. TRANSMITTER

**1.1** The Transmitter circuitry consists of the Transmitter PCB, the Display and Keyboard PCB, an Internal Induction Antenna, and the Batteries and Fuse.




**Transmitter Block Diagram**

**1.2** The Transmitter's main signal generator is a high-resolution, two-channel, wide-band, digital synthesizer. This synthesizer produces the Transmitter's output frequencies. The gain of each channel of the synthesizer is controlled by the microprocessor using a multiplying digital-to-analog con-

verter (DAC). The outputs of the gain control DACs are summed together and sent to a pulse-width modulator. The analog signal from the synthesizer modulates a 1 MHz square wave used as a switching frequency for the class-D Output Amplifier.

**1.3** The output of the pulse-width modulator first goes to the dead band generator where the signal is split into two channels and synchronized so that pulses of one channel do not occur at the same time as the other channel. Each channel is then amplified by a separate driver amplifier. These drivers use the battery voltage instead of the normal +5 volt digital supply to increase the swing of the square wave inputs. The outputs of the drivers go to the class-D Power Amplifier.

**1.4** The class-D power amplifier is powered by a microprocessor controlled high voltage power supply. The power supply is used by the microprocessor as a coarse control of the output signal level. Fine control is accomplished by the gain control circuitry at the output of the synthesizer. Signal level feedback to the microprocessor comes from the current-sense circuitry at the output of the class-D power amplifier. The output of the class-D amplifier is a pulse-width modulated square wave. A low pass filter recovers the sinusoidal modulating waveform.

**1.5** The signal output can be switched to either a low-frequency boost transformer stage used to step up the sheath fault and tone signals, to the internal induction coil, or to the front panel output jack.

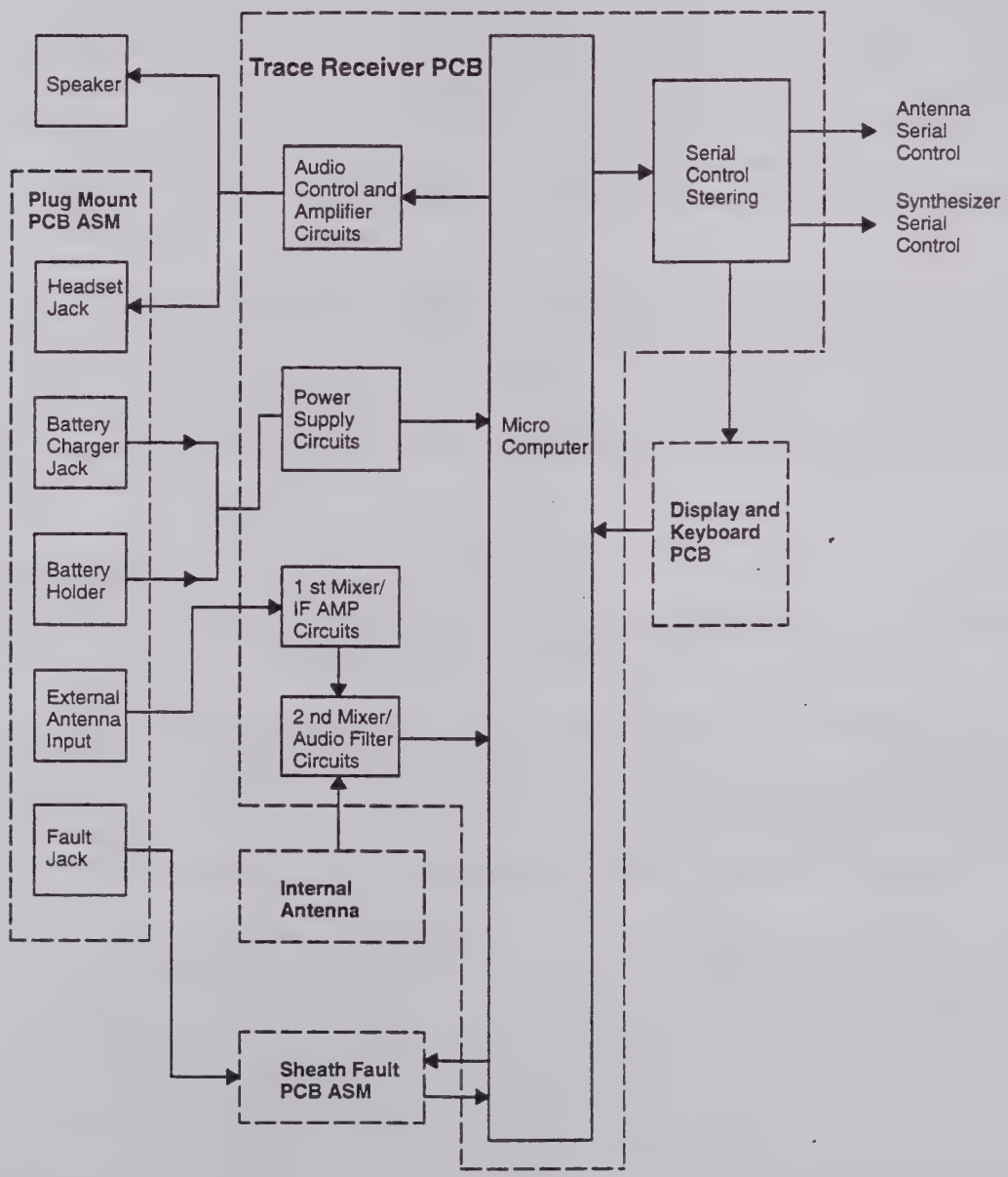
**1.6** The Transmitter can measure the resistance or voltage of a circuit connected to its output jack. A logarithmic ohms sense circuit supplied by the high voltage power supply and a volts sense circuit measuring either AC or DC voltages are provided for these functions. Both circuits are connected to the output jack by relays under microprocessor control.

**1.7** A microprocessor-controlled buzzer circuit provides audio feedback about the state of the Transmitter.

**1.8** The unit is powered by 6 D-size batteries. You can use either alkaline or re-chargeable Ni-Cd batteries. Battery voltage, load current, and temperature readings determine the remaining battery capacity which is continuously displayed. For the re-chargeable Ni-Cd batteries, an optional battery charging kit is available. This kit supplies 12 volts DC to the battery charging jack on the front panel. A charger circuit is provided to maintain the proper current to charge the batteries.

## 2. RECEIVER

**2.1** The Receiver circuitry consists of the Trace Receiver PCB, Sheath Fault PCB, Display and Keyboard PCB, Internal Antenna, Plug Mount PCB, Speaker, and Battery. The Receiver detects frequencies from 512 Hz to 200 kHz. To accomplish this, a front end with the required filtering and gain to obtain low frequency sensitivity and selectivity precedes the main receiver. This low frequency front end is bypassed when you select frequencies above 7 kHz. The low frequency circuitry is in the external antenna housing that contains the Antenna/Probe Upper and Lower PCBs.




**Receiver Block Diagram**

## A. Trace Receiver PCB

**2.2** The trace receiver PCB is the receiver's primary PCB. It provides the main signal path from the antenna(s) to the microprocessor. The microprocessor (also contained on this PCB) samples the output of the main signal path, controls the AGC (automatic gain control), selects the antennas, receives information from the keyboard, and sends information to the LCD (liquid crystal display) as well as controls the volume of the speaker or headphones.

**2.3** The main signal path begins at the external antenna input jack and terminates at the microprocessor's A/D (analog-to-digital) port. Signals applied to the antenna jack from the probe antenna are in the range of 7 kHz to 200 kHz. These frequencies are amplified, filtered, and then converted to 1025 kHz by the first mixer stage. The 1025 kHz output of the first mixer goes to the IF amplifier stage, which is gain controlled by the microprocessor. The IF amplifier output goes to the second mixer where it is converted to 1 kHz. The second mixer provides two inputs to the audio filter. This filter amplifies and filters the signal to a level and bandwidth that the microprocessor can use. The microprocessor can change the filter bandwidth. The filter can also be 'reset' so the A/D converter does not read residual signals from a previous measurement. Two outputs are provided to the microprocessor A/D port. One of the outputs also drives the speaker or headset.

**2.4** Other circuits contained on the trace receiver PCB include the receiver power supply circuits, and the audio control and amplification circuits. The microprocessor contains a serial port and a parallel port. The serial port and the associated serial steering circuitry control the frequency synthesizer and audio filter, select the antennas, and send data to the display. The parallel port is bi-directional. It reads data from the keyboard via the keyboard buffer circuitry and writes data to control the AGC and audio to the speaker.

## B. Sheath Fault PCB

**2.5** The sheath fault PCB provides two features: the tone mode and the fault mode. These modes are not available on the 500D, 500DE, and 2220 units and this PCB is not present on those units.

**2.6** In the tone mode, the transmitter outputs one of two audio-frequency-signals, either 578.125 Hz or 484.375 Hz. This signal is applied to conductors, such as a shorted pair or a conductor shorted to its shield, that provide a current path. The current creates an AC magnetic field around the conductors. This magnetic field induces a current to flow in a toning coil when it is held near the conductors. The Sheath Fault PCB provides amplification and filtering of the signal from the toning coil.

**2.7** In the fault mode, the transmitter is connected between the shield of a buried cable and a ground rod. The transmitter supplies a signal made of two audio frequencies at 15.625 and 31.25 Hz. The lower frequency signal is called the 1F signal and the higher frequency is called the 2F signal. The output lead of the transmitter is connected to the shield of a buried cable. The shield is usually covered with non-conductive sheath, but where the sheath is damaged, the shield will be in contact with the earth. This earth contact point is called an earth fault. The ground lead of the transmitter's output is connected to earth by means of a ground rod. Current from the transmitter flows from the output lead through the shield to the point of the fault then back to the transmitter through the earth and the ground rod. The current density is much greater at the fault and at the ground rod. The current passes through

the resistance of the earth and forms voltage gradients. Viewed from the earth's surface, these voltage gradients are perpendicular to the lines of current and are circular around the fault and ground rod. By using two electrodes to make contact with the earth, you can measure the voltage amplitude and the phase difference of the 1F and 2F signals. The Sheath Fault PCB provides amplification, filtering, and separation of the composite 1F/2F signal that is picked up by the earth contact frame. The separated signals are then sent to the trace receiver PCB where the microprocessor determines the relative phase differences of the signals, hence, the direction of the fault relative to the earth contact frame. The bar graph indicates the orientation of the earth contact frame to a buried fault. The bar graph will be black on one side or the other. The display has two markers on either side of the display corresponding to markings on the earth contact frame. The markers are red (left side) and green (right side).

**2.8** Power to the Sheath Fault PCB comes from the receiver batteries (VB). The +5V and MID-GROUND PWR SUPPLIES provide +5V for all circuits and mid-ground references (+2V) for the op-amps.

## C. Display/Keyboard PCB

**2.9** The custom Liquid Crystal Display is constructed of 75 segments which can be turned on or off to indicate the various functions or status of the receiver. The segments are arranged as follows:

**Bargraph:** 30 individual segments:

**Triangular Flags:** 12 individual segments;

**Battery level Indicator:** 4 individual segments;

**Numeric Indicator:** 21 individual segments;

**Audio Level Indicator:** 4 individual segments;

**Left-Right Indicators:** 2 individual segments; and

**Depth Measurement Units:** 2 individual segments.

**2.10** The segments are sandwiched in glass over a conductive backplane which covers the total bottom surface of the LCD. When the voltage between the backplane and an individual segment is non-zero the segment becomes visible through the top surface of the LCD.

## D. Antenna/Probe PCBs

**2.11** In the trace modes (Peak, Special Peak, Null, DIFF, and Depth), all signals processed by the Receiver come from the antennas. There are four antennas in the external antenna probe and one antenna mounted inside the Receiver itself. All the antennas are of the ferrite core coil type which has a maximum response when the core is parallel to the electromagnetic field. The field produced in a buried conductor is circular and concentric with the conductor. An antenna mounted parallel to the ground produces the highest amplitude signal as it passes through the field. An antenna oriented in this way produces a minimum-maximum-minimum response as it is translated across the circular field. This

'min-max-min' response is called a peak response. Conversely, an antenna mounted vertical to the surface of the ground produces an opposite 'max-min-max', or null response. Antennas are mounted both horizontally and vertically to produce both peak and null responses. The following describes how each mode uses the antennas.

**Peak mode:** both the top peak and the bottom peak antennas are enabled at the same time.

**Special Peak mode:** only the bottom peak antenna is selected.

**Null mode:** only the bottom null antenna is used.

**Diff mode:** all four antennas are activated in sequence.

**Depth mode:** first the bottom peak antenna is activated then, the top peak antenna. This allows a single depth calculation. This antenna selection cycle continues as long as you have the depth mode selected.

**2.12** The external antenna probe contains four PCBs with the circuitry to achieve the sensitivity and selectivity for low frequencies around 500 Hz.

*Note: 'Low frequency operation' or 'low frequency mode' refers to acquisition and processing of signal frequencies less than 7 kHz. The following lists the specific low frequencies that each model will process.*

573DL and 500DL – 577 Hz, 512 Hz, and 540 Hz (9th harmonic of 60 Hz power frequency),

573DLE and 500DLE – 484 Hz, and 450 Hz (9th harmonic of 50 Hz power frequency), and

2220L and 4420L – 577 Hz, and 540 Hz (9th harmonic of 60Hz power frequency).

# Troubleshooting and Disassembly Instructions

## 1. OPERATIONAL CHECK

**1.1** Equipment required: Fluke® 8060A DVM or equivalent and AC/DC voltage source (up to 120 volts).

**1.2** Use the following procedure for a quick check of proper test set operation. If the test set fails to respond as specified in the "Results/Display" column, replace the components in the order listed in the "If Test Set Fails" column.

## Set Up and Test Requirements

| Transmitter | | |
|---|---|---|
| **Action** | **Results/Display** | **If Test Set Fails** |
| Press the transmitter On/Off key. | All display segments on momentarily<br>Display defaults to volts<br>Audible beep every four seconds<br>Battery display symbol full (if batteries are fully charged) | 1. Replace batteries<br>2. Replace fuse<br>3. Replace transmitter PCB<br>4. Replace display PCB<br>5. Replace power wire harness |
| **Voltmeter Test** | | |
| **Action** | **Results/Display** | **If Test Set Fails** |
| Press Volts key. | | |
| Connect transmitter to 50 volts DC using Direct Connect Cable. | 4 to 5 bar segments lit | 1. Replace transmitter PCB<br>2. Replace display PCB |
| Connect transmitter to 120 volts AC using Direct Connect Cable). | 8 to 10 bar segments lit | |
| Disconnect cable from voltage source. | | |
| **Ohmmeter Test** | | |
| **Action** | **Results/Display** | **If Test Set Fails** |
| Press Ohms key. | Open bar graph | 1. Replace transmitter PCB<br>2. Replace display PCB |
| Plug Direct Connect Cable into transmitter output jack. | | |
| Short red and black leads together. | Full scale bar graph | |
| Connect red and black leads to DC voltmeter. | DVM reads 45 to 55 volts DC | |
| Remove cable from transmitter output jack. | | |

| Trace Mode Test | | |
|---|---|---|
| **Action** | **Results/Display** | **If Test Set Fails** |
| Press Trace key. | Flag under TRACE<br>Half–scale bar graph | 1. Replace transmitter PCB<br>2. Replace display PCB |
| Set output level to high. | Flag over HI LVL<br>Full scale bar graph | |
| Set Freq 1 to F1. | | |

*Note: For model 500D, connect probe antenna to receiver for following portion of test.*

| Receiver | | |
|---|---|---|
| **Action** | **Results/Display** | **If Test Set Fails** |
| Press the receiver On/Off key. | All display segments on momentarily | 1. Replace receiver PCB<br>2. Replace display PCB<br>3. Replace speaker<br>4. Replace speaker wire harness |
| Select a speaker audio level. | | |
| Set to Peak Mode. | Flag under Peak | |
| Set frequency to F1. | Flag over F1 | |
| Hold receiver three feet away from, and perpendicular to, transmitter. | | |
| Press Gain Adjust key. | Speaker tone audible<br>6 to 10 bar graph segments open | |
| Point receiver jack panel toward transmitter. | No speaker tone<br>One bar graph segment on each side lit | |
| Repeat previous three steps for F2, F3, and F4. | Same results as above | |
| Turn off receiver. | | |

| Transmitter | | |
|---|---|---|
| **Action** | **Results/Display** | **If Test Set Fails** |
| Connect transmitter to DVM with Direct Connect Cable. | | |
| Set DVM to 200 volts AC. | DVM reads 20 to 30 volts AC | 1. Replace transmitter PCB |
| Repeat previous step for F2, F3, and F4. | Same results as above | |

*Note: For all models, the upper limit for F4 is 33.6 volts.*

| | | |
|---|---|---|
| Set Freq 1 to F1. | | |
| Set DVM to 200 mA AC. | Full–scale bar graph<br>DVM current reading 50 to 150 mA AC | 1. Replace transmitter PCB<br>2. Replace display PCB |
| Set Output Level to normal. | Half–scale bar graph<br>DVM current reading 5 to 15 mA AC | |

| Tone Mode Test | | |
|---|---|---|
| **Action** | **Results/Display** | **If Test Set Fails** |
| Select Tone mode. | Flag under Tone<br>Half–scale bar graph<br>DVM current reading is 2 to 5 mA (see note below) | 1. Replace transmitter PCB<br>2. Replace display PCB |

*Note: The DVM should measure 2 to 5 mA if the Transmitter's Output Mode Symbol (sinewave) is not flashing. If the sinewave symbol is flashing, press the Freq 2 key. The DVM current reading should now be 2 to 5 mA.*

| | | |
|---|---|---|
| Set DVM to 200 volts AC. | DVM reads 8 to 12 volts AC | 1. Replace transmitter PCB<br>2. Replace display PCB |
| Set output level to high. | DVM reads 60 to 100 volts AC | |
| Set DVM to 200 volts AC ( press Hz). | DVM reads 578.1 Hz | |
| **Fault Mode Test** | | |
| **Action** | **Results/Display** | **If Test Set Fails** |
| Select Fault mode. | Flag under Buried Fault | 1. Replace transmitter PCB<br>2. Replace display PCB |
| Press Freq 1 key, if needed, to select no frequencies. | DVM reads 15.62 Hz | |
| Set DVM to 20 volts AC ( press Hz). | DVM reads 31.25 Hz | |
| Set DVM to 200 volts AC. | DVM reads 60 to 100 volts AC | |
| Set DVM to 200 mA AC. | DVM reads 2 to 5 mA AC | |

*Note: If the test set's display is blank or intermittent when you press the ON/OFF key and you know the fuse and batteries are good, clean the battery contact points.*

**1.3** For more troubleshooting information, refer to the care and maintenance section of your operators manual.

## 2. TRANSMITTER DISASSEMBLY INSTRUCTIONS (refer to figures 5 and 6)

**2.1** Tools required: 5/64 inch hex wrench, #1 cross-tip and flat-blade screwdriver.

**2.2** The transmitter has three basic parts or assemblies:

1. the base (part 74);
2. the cover (part 75); and
3. the control panel assembly containing the transmitter PCB (part 76), the display/keyboard PCB (part 77), the internal antenna panel (part 83), and the battery housing (part 86).

**2.3** To remove the control panel assembly from the base, first remove the battery cover (part 81). This will expose 2 Phillips-head screws (part 117) which must be removed. Next, remove the four hex-head screws (part 118) along the outer edge of the control panel (part 85). After you remove these six screws, lift the assembly out of the base.

## 3 RECEIVER DISASSEMBLY INSTRUCTIONS (refer to figures 7, 8, 9, and 10)

**3.1** The receiver consists of three basic assemblies:

1. the lower housing (part 53), containing the sheath fault PCB (part 7), the trace receiver PCB (part 51), the internal antenna PCB (part 10), the connector PCB (part 11), the speaker and the battery box;

*Note: Models 500DL, 500DLE, and 2220L will not have the sheath fault PCB* (part 7) *and models 500DL and 500DLE will not have the internal antenna PCB* (part 10).

2. the upper housing (part 52), containing the display/keyboard PCB, and the handle assembly; and

3. the gasket (part 54), which separates the upper and lower housings.

**3.2** Invert the receiver and remove the battery box cover (part 55). Remove the batteries. Remove four screws (part 123) holding the connector cover and remove the cover. To separate the upper and lower receiver housings, remove the two screws from the battery box (part 98), the two screws from the antenna well and the standoff screws (part 96) from the front of the connector PCB. Turn the receiver upright (be careful to catch the loosened screws) and lift the upper housing by the handle. The ribbon cable from the trace receiver PCB in the lower housing to the display/keyboard PCB in the upper housing contains enough slack to set the upper housing on its side next to the lower housing.

## 4. EXTERNAL ANTENNA DISASSEMBLY INSTRUCTIONS (refer to figures 11 and 12)

**4.1** The external antenna consists of four basic parts or assembles:

1. the front and rear housings (parts 16 and 17);

2. the antenna handle assembly (part 18), attached to the rear housing;

3. the antenna gasket (part 19), which separates the two housing halves; and

4 the upper and lower antenna PCBs, attached to the rear housing.

**4.2** The front and rear housings are held together by 12 screws (part 23) which are exposed on the rear housing. Remove the 12 screws and the two halves will separate. Remove the gasket and store in a safe place. On the front housing, each screw boss has an 'O' ring (part 30), which may fall off if the housing is handled roughly. Be careful not to lose any of the 'O' rings while the housings are separated.

## 5. HARDWARE PARTS LISTS

5.1 The following parts lists are arranged so that parts common to all models are listed first. These common parts are hardware items such as screws, housings, gaskets, batteries, etc. Hardware parts which are unique to a particular model are listed next.

# Parts List for Common Parts Used On All Models

3M DYNATEL SYSTEMS DIVISION
PARTS LIST, ITEMIZED
3/03/93

| 3M PART NUMBER | REV | -----PART NAME------ | --DESCRIPTION-- | --REFERENCE DESIGNATORS |
|---|---|---|---|---|
| 78-8065-2425-8 | | CU KIT,COMMON LIBRA | 500D/573D | |
| 78-8079-8478-2 | | BOOKLET,WARRANTY RTN | | |
| 00-0282-3200-1 | A | CABLE,CONFIG DNLOAD | REF DRWING ONLY | |
| 09-1009-7200-1 | A | TP,EVM COMM | | |
| 10-0016-4100-1 | G | ASSY,500D/573D RCVR | DRAWING ONLY! | |
| 10-0016-4200-1 | M | ASSY,500D/573D XMTR | DRAWING ONLY! | |
| 78-8079-8571-4 | | SHT,INFO,BATT | | |
| 34-7020-0238-6 | | LABEL,CONTENTS | PKG ENGR PN | |
| 34-7020-0250-1 | | BAG, POLY ZIP-LOCK | PKG ENGR PN | |
| 34-7027-3216-4 | | LBL,BATTERY NOTICE | PKG ENG PN | |
| 34-7027-9685-4 | | CNTNR,SHIPPING | PKG ENG PN | |
| 34-7027-9940-3 | F | STD,PKG, 500D/573D | PKG ENG PN | |
| 34-7031-7624-7 | | FOAM,CUSHION,PREMLD | PKG ENG PN | |
| 34-7031-7625-4 | | FOAM,CUSHION,PREMLD | PKG ENG PN | |
| 56-0353-1240-6 | | BAG,SHPG,9.5X14.5 | PKG ENG P/N | |
| 70-0060-8939-8 | | TAPE,#375 CLR,2 INCH | PKG ENG PN | |
| 78-8036-6321-6 | | SHEET,MICRO FOAM | 36 X 450' | |
| 78-8065-3329-1 | | RCVR,HSNG,UPPER | | FN052 |
| 78-8065-3104-8 | | RCVR HOUSING, LOWER | | FN053 |
| 78-8065-2878-8 | | GASKET,RECEIVER,LEO | | FN054 |
| 78-8065-3331-7 | | COVER,BATT,RCVR | | FN055 |
| 78-8065-3409-1 | | GASKET,RCVR,BATT | | FN056 |
| 78-8065-2951-3 | | HANDLE,RCVR | | FN057 |
| 78-8065-2952-1 | | HANDLE CAP,RCVR | | FN058 |
| 78-8065-2136-1 | | PLATE,PROGRAMMING | LEO | FN061 |
| 78-8065-2954-7 | | COVER,CONNECTOR | | FN062 |
| 78-8065-3759-9 | | ASSY, CONTACT A | | FN063 |
| 78-8065-3780-5 | | ASSY, CONTACT B | | FN064 |
| 78-8065-2398-7 | | CONTACT C BATTERY | | FN065 |
| 78-8065-3781-3 | | ASSY, CONTACT D | | FN066 |
| 78-8065-2146-0 | | GASKET,CONNECTOR | LEO | FN067 |
| 78-8057-4934-4 | | GASKET SPKR,745 | | FN068 |
| 26-1007-7517-5 | | SPEAKER MYLAR 32 OHM | | FN069 |
| 78-8065-2348-2 | | GASKET,LENS | | FN070 |
| 26-1009-6237-7 | | SPACER, ROUND, ALUM | 3/8X.257 1.0 LG | FN071 |
| 78-8065-3790-4 | | BASE,XMTR | | FN074 |
| 78-8093-0038-3 | | LID,XMTR | 500D/573D | FN075 |
| 78-8065-3727-6 | | STRAP,HANDLE,XMTR | | FN078 |
| 26-1010-1420-2 | | LATCH, CASE NON-LOCK | BRIGHT NICKEL | FN080 |
| 78-8065-3000-8 | | PLATE,BATTERY COVER | | FN081 |
| 78-8065-2032-2 | | GASKET,BATTERY | | FN082 |
| 78-8065-2789-7 | | PANEL,ANT MOUNT | | FN083 |
| 78-8065-2836-6 | | ANTENNA,XFMR COIL | | FN084 |

| 3M PART NUMBER | REV | -----PART NAME------ | --DESCRIPTION-- | --REFERENCE DESIGNATORS |
|---|---|---|---|---|
| 78-8065-3742-5 | | CONTROL PNL,XMTR | DSB 7/11/95 | FN085 |
| 78-8065-3799-5 | | HOUSING,BATT W/267 | | FN086 |
| 78-8079-8528-4 | | GASKET,CONTROL PANEL | | FN087 |
| 78-8065-2030-6 | | BRKT,SUPPORT,PCB | LEO | FN088 |
| 78-8063-2582-1 | | BRKT,PNL | LEO | FN089 |
| 26-1004-5062-1 | | BODY, FUSEHOLDER 3AG | 345-611-010 | FN090 |
| 26-1004-5063-9 | | KNOB, FUSEHOLDER 3AG | 345-610-020 | FN091 |
| 78-8412-9427-1 | | FUSE, 1A 250V 3AG | | FN092 |
| 26-1009-6240-1 | | SCR,CAP SKT HD | 1/4-20X1-1/2 SS | FN093 |
| 78-8065-2758-2 | | SCREW,CAPTIVE,6-32 | UNC | FN094 |
| 26-1008-2859-4 | | WASHER,RETAINER 6-32 | CAPTIVE SCREW | FN095 |
| 78-8065-2154-4 | | STNDOFF,M/F6-32/4-40 | LEO | FN096 |
| 78-8065-2719-4 | | STANDOFF, M/F | 500D/573D | FN097 |
| 26-1007-5522-7 | * | SCR,PAN HD PH SLF TP | 6 X 3/4 | FN098 |
| 78-8036-4910-8 | | SCR,PAN HD PH SLF TP | 4 X 1/4 | FN099 |
| 78-8036-4913-2 | | SCR,PAN HD PH SLF TP | 6 X 3/8 | FN100 |
| 26-1003-3118-5 | | WASHER, FLAT #4 | 26-1003-3118-5 | FN102 |
| 78-8036-4800-1 | | SCR,PAN HD PH SLF LC | 4-40 X 1/4 | FN103 |
| 26-1003-3126-8 | | WASHER, FLAT NYL #4 | 2255-D-120 | FN104 |
| 78-8036-4803-5 | | SCR,PAN HD PH SLF LC | 4-40 X 1/2 | FN105 |
| 78-8036-5330-8 | | WIRE, HOOK-UP 22 AWG | 8503 BLACK | FN106 |
| 26-1004-3055-7 | | CONN, CLOSED HOUSE | 24 AWG 4 CKT | FN107 |
| 26-1008-4759-4 | | TERMINAL, RING #4 | 24AWG MNG24-4R | FN108 |
| 26-1006-4493-4 | | WIRE, 24AWG TWIST PR | RED-BLACK UL | FN109 |
| 26-1006-4495-9 | | WIRE, 24AWG TWIST PR | YELLOW-ORNG UL | FN110 |
| 78-8036-5322-5 | | WIRE, HOOK-UP 22 AWG | 8503 RED | FN111 |
| 26-1006-3502-3 | | RECEPTACLE, WIRE CON | AMP 61291-1 | FN112 |
| 26-1006-4740-8 | | SOCKET, WIREMOUNT-2 | .156 SPACING | FN113 |
| 26-1002-0813-6 | | MOUNT, CABLE TIE .75 | MPNY-750 NA-D | FN114 |
| 26-1003-9730-1 | | TUBING HEAT SHRINK | 1/8 BK PVC | FN115 |
| 78-8036-4878-7 | | SCR,PAN HD PH | 4-40 X 5/8 | FN116 |
| 26-1008-4997-0 | | SCR FLT HD PH UNDCUT | 6-32 X 3/8 BLK | FN117 |
| 78-8026-9052-5 | | SCR,BTN HD SKT BLACK | 6-32 X 7/16 | FN118 |
| 78-8036-4877-9 | | SCR,PAN HD PH | 4-40 X 7/16 | FN119 |
| 78-8036-4912-4 | | SCR,PAN HD PH SLF TP | 4 X 1/2 | FN120 |
| 78-8036-4911-6 | | SCR,PAN HD PH SLF TP | 4 X 3/8 | FN121 |
| 78-8036-4802-7 | | SCR,PAN HD PH SLF LC | 4-40 X 3/8 | FN122 |
| 78-8036-4815-9 | | SCR,FLT HD PH SLF LC | 4-40 X 1/4 | FN123 |
| 26-1003-6606-6 | | CABLE TIE | PLT1.5M | FN124 |
| 78-8079-8507-8 | | CABLE ASSY,GRND LEAD | | FN125 |
| 78-8065-3871-2 | | GROUND ROD | 573A | FN126 |
| 26-0000-4787-3 | | BATTERY, 1.5V | MN1400 ALKALINE | FN127 |
| 26-0000-4790-7 | | BATTERY, 1.5V 'D' | MN1300 ALKALINE | FN128 |
| 78-8065-3354-9 | | BATT CONTACT,NEG,XMT | PURCHASED ASSY | FN129 |
| 78-8065-3317-6 | | BATT CONTACT,POS, | XMTR PURCH ASSY | FN130 |
| 78-8065-3318-4 | | ASSY,PLATE,BATT CVR | PURCHASED ASSY | FN131 |
| 78-8036-6253-1 | | WASHER, CNTRSNK #8 | ALUMINUM | FN132 |
| 78-8026-9070-7 | | RTV, DOW CHEM #3140 | 3 OZ TUBE | FN133 |

CAUTION
CHANGES HAVE BEEN MADE
ON THIS
SEE ISSUE SHEET.

| 3M PART NUMBER | REV | -----PART NAME------ | --DESCRIPTION-- | --REFERENCE DESIGNATORS |
|---|---|---|---|---|
| 78-8036-6239-0 | | NUT, HEX SELF-LKG | 79NTM-62 | FN134 |
| 26-1003-3198-7 | | WASHER, FLAT #6 | MS15795-805 | FN135 |
| 26-1008-2694-5 | | HANDLE, MACS 3000 | BRUCE 0861-0014 | FN136 |
| 26-1003-9213-8 | | SCR,FLT HD PH 100DEG | 6-32 X 1/2 | FN137 |
| 78-8036-6238-2 | | NUT, HEX SELF-LKG | 79NTM-40 | FN138 |
| 78-8036-6335-6 | | SEAL, SCREW-LOCKING | 80413 BLUE 1 OZ | FN139 |
| 78-8036-6299-4 | | GLUE, HOT MELT | | FN140 |
| 78-8079-8541-7 | | LBL,FOR SVCE RETURN | | FN142 |
| 26-1006-6125-0 | | TAPE,SILICONE, 1/2W | 1/4 THK, SOFT | FN147 |
| 26-1006-2172-6 | | TAPE,SILICONE,1WIDE | 1/8 THK, SOFT | FN148 |
| 78-8065-3349-9 | | PLATE,XMTR LATCH,LEO | | FN150 |
| 26-1003-9227-8 | | SCR,PAN HD PH | 4-40 X 7/8 | FN151 |
| 78-8065-3362-2 | • | PLATE,LATCH,XMTR,LID | | FN154 |
| 78-8065-1902-7 | | LCD w/Keyboard (RcvR) | $ 236.74 | |
| 78-8065-2077-7 | | LCD w/o Keyboard (RcvR) | $ 26.54 | |
| 78-8065-3803-5 | | LCD Lens (xmit + Rcv) | 2.83 | |
| 80-6105-9820-5 | | CABLE Assy, RcvR, Long | | |

DSB 7/11/95

CHAN MADE

SEE ISSUE SHEET.

# Unique Parts List for Model 573DL

3M DYNATEL SYSTEMS DIVISION
PARTS LIST, ITEMIZED
3/03/93

| 3M PART NUMBER | REV | -----PART NAME------ | --DESCRIPTION-- | --REFERENCE DESIGNATORS |
|---|---|---|---|---|
| 44-0017-7157-3 | AB | ASSY,573DL,UNIQUE | | |
| 78-8065-2425-8 | CU | KIT,COMMON LIBRA | 500D/573D | |
| 09-1009-7200-1 | A | TP,EVM COMM | | |
| 09-1009-8200-1 | B | TP,500D/573D CALIB | | |
| 00-0000-0000-0 | A | TP,573D,REPAIR FINAL | | |
| 00-0000-0000-0 | 05 | SW,CONFIG DWNLD,LEO | VER 02.05 11/11 | |
| 10-0016-4100-1 | G | ASSY,500D/573D RCVR | DRAWING ONLY! | |
| 10-0016-4200-1 | M | ASSY,500D/573D XMTR | DRAWING ONLY! | |
| 78-8079-8488-1 | | MAN,LVLI,573DL | | |
| 10-0016-6700-1 | C | ASSY,500DL/573DL ANT | REF DWG ONLY! | |
| 34-7020-0238-6 | | LABEL,CONTENTS | PKG ENGR PN | |
| 34-7028-6740-8 | B | PKG STD,ANTENNA | PKG ENG PN | |
| 34-7028-6769-7 | | BOX,SHIPPER | PKG ENG PN | |
| 70-0023-2311-4 | | TAPE,FILAMENT | PKG ENG PN | |
| 78-8065-3760-7 | | LABEL,SERIAL | 5XXD SERIES | FN001 |
| 78-8065-3739-1 | | OVERLAY,RCVR,FAULT | LOCATOR | FN002 |
| 78-8065-3762-3 | | LABEL,NAMEPLATE | FAULT LOCATOR | FN003 |
| 78-8065-3737-5 | | OVERLAY,XMTR,FAULT | LOCATOR | FN004 |
| 78-8093-0022-7 | | LBL,INST,FLT LOCATOR | | FN005 |
| 78-8093-0061-5 | | LBL,CONN,573DLE | | FN006 |
| 78-8065-1980-3 | M | PCB ASSY,SHEATH | FAULT RCVR LEO | FN007 |
| 78-8065-2854-9 | | CABLE ASSY,EARTH FRM | | FN008 |
| 78-8051-5854-6 | V | GRND FRAME ASSY,3014 | MDL 573 | FN009 |
| 78-8065-2075-1 | M | PCB ASSY,INTERNAL | ANTENNA LEO | FN010 |
| 78-8065-2063-7 | E | PCB ASSY,CONN BD | 573D | FN011 |
| 78-8093-0027-6 | | CBL ASSY,RCVR,SHORT | | FN012 |
| 78-8051-5846-2 | J | DYNACOUPLER ASM,3001 | 3 | FN014 |
| 78-8065-2855-6 | | CABLE ASSY,COUPLER | | FN015 |
| 78-8065-3511-4 | | ANTENNA HOUSING,FRNT | | FN016 |
| 78-8065-3512-2 | | ANTENNA HOUSING,REAR | | FN017 |
| 78-8065-2957-0 | | HANDLE,ANTENNA | | FN018 |
| 78-8065-2879-6 | | GASKET,ANTENNA,LEO | | FN019 |
| 78-8065-2920-8 | D | PCB ASSY,500DL/573DL | PROBE,UPPER | FN020 |
| 78-8065-2922-4 | D | PCB ASSY,500DL/573DL | PROBE LOWER | FN021 |
| 78-8036-4911-6 | | SCR,PAN HD PH SLF TP | 4 X 3/8 | FN022 |
| 26-1008-4267-8 | | SCR,PAN HD SLF TP | 4 X 5/8 | FN023 |
| 26-1002-0813-6 | | MOUNT, CABLE TIE .75 | MPNY-750 NA-D | FN024 |
| 26-1006-4606-1 | | SOCKET, WIREMOUNT-8 | .100 SPACING | FN025 |
| 26-1006-4495-9 | | WIRE, 24AWG TWIST PR | YELLOW-ORNG UL | FN026 |
| 26-1006-1156-0 | | CABLE, COAXIAL, MINI | BELDEN 9264 UL | FN027 |
| 78-8036-6299-4 | | GLUE, HOT MELT | | FN028 |
| 26-1003-6606-6 | | CABLE TIE | PLT1.5M | FN029 |
| 78-8000-7217-1 | | O-RING, RUBBER | .4375 OUTER DIA | FN030 |

| 3M PART NUMBER | REV | -----PART NAME------ | --DESCRIPTION-- | --REFERENCE DESIGNATORS |
|---|---|---|---|---|
| 26-1004-3816-2 | | WASHER, #4 SPECIAL | 5710-266-30 | FN031 |
| 26-1006-7615-9 | | SPACER 1/4 ROUND | .171 ID 1.50 LG | FN032 |
| 26-1002-8277-6 | | GROMMET, 1/8 RUBBER | HHS 2185 | FN035 |
| 78-8065-2826-7 | | BRKT,ANTENNA DETENT | | FN036 |
| 26-1004-0495-8 | | GREASE, DC4 SILICONE | | FN037 |
| 70-0701-0055-0 | | FASTENER, HOOK&LOOP | SJ-3526-3/4 BLK | FN038 |
| 70-0700-9365-6 | | FASTENER,HOOK&LOOP | SJ-3527-3/4 BLK | FN039 |
| 78-8065-2835-8 | | CBL ASSY,DIR CONN | | FN041 |
| 78-8065-3402-6 | | COIL ASSY,ANTENNA | UP/LOW | FN042 |
| 26-1006-5156-6 | | ROD, FERRITE ROUND | 30-61-34000-1 | FN043 |
| 26-1009-6504-0 | | SPACER,1/4 RND NYLN | .115ID X .625LG | FN044 |
| 78-8079-8513-6 | | LBL,ANT,5XXDL SERIES | | FN045 |
| 26-1006-4496-7 | | WIRE, 24AWG TWIST PR | GRAY-WHITE UL | FN046 |
| 78-8036-5343-1 | | WIRE, HOOK-UP 24 AWG | 1429 RED UL | FN047 |
| 78-8040-0732-2 | | WIRE, HOOK-UP 24 AWG | 1429 GREEN UL | FN048 |
| 26-1003-9227-8 | | SCR,PAN HD PH | 4-40 X 7/8 | FN049 |
| 78-8065-1902-7 | L | PCB ASSY,RCVR | DISP/KYBD LEO | FN050 |
| 78-8065-1909-2 | W | PCB ASSY,TRACE RCVR | LEO | FN051 |
| 78-8065-3724-3 | | BRKT,SPKR,MNTG,LIBRA | | FN059 |
| 78-8065-1917-5 | W | PCB ASSY, XMTR | 500D/573D | FN076 |
| 78-8065-1900-1 | K | PCB ASSY, XMTR | DISP/KYBD LEO | FN077 |

# Unique Parts List for Model 573DLE

3M DYNATEL SYSTEMS DIVISION
PARTS LIST, ITEMIZED
3/03/93

| 3M PART NUMBER | REV | -----PART NAME------ | --DESCRIPTION-- | --REFERENCE DESIGNATORS |
|---|---|---|---|---|
| 44-0017-7207-6 | R | ASSY,573DLE UNIQUE | | |
| 78-8065-2425-8 | CU | KIT,COMMON LIBRA | 500D/573D | |
| 09-1009-7200-1 | A | TP,EVM COMM | | |
| 09-1009-8200-1 | B | TP,500D/573D CALIB | | |
| 00-0000-0000-0 | A | TP,573D,REPAIR FINAL | | |
| 00-0000-0000-0 | 05 | SW,CONFIG DWNLD,LEO | VER 02.05 11/11 | |
| 10-0016-4100-1 | G | ASSY,500D/573D RCVR | DRAWING ONLY! | |
| 10-0016-4200-1 | M | ASSY,500D/573D XMTR | DRAWING ONLY! | |
| 10-0016-6700-1 | C | ASSY,500DL/573DL ANT | REF DWG ONLY! | |
| 78-8079-8524-3 | | SHEET,INST,500DLE | | |
| 78-8079-8492-3 | | MAN,LVLI,573DLE TEL | | |
| 78-8079-8493-1 | | MAN,LVLI,573DLE,PWR | | |
| 34-7020-0238-6 | | LABEL,CONTENTS | PKG ENGR PN | |
| 34-7028-6740-8 | B | PKG STD,ANTENNA | PKG ENG PN | |
| 34-7028-6769-7 | | BOX,SHIPPER | PKG ENG PN | |
| 70-0023-2311-4 | | TAPE,FILAMENT | PKG ENG PN | |
| 78-8065-3760-7 | | LABEL,SERIAL | 5XXD SERIES | FN001 |
| 78-8065-3739-1 | | OVERLAY,RCVR,FAULT | LOCATOR | FN002 |
| 78-8065-3762-3 | | LABEL,NAMEPLATE | FAULT LOCATOR | FN003 |
| 78-8065-3737-5 | | OVERLAY,XMTR,FAULT | LOCATOR | FN004 |
| 78-8093-0022-7 | | LBL,INST,FLT LOCATOR | | FN005 |
| 78-8093-0061-5 | | LBL,CONN,573DLE | | FN006 |
| 78-8065-1980-3 | M | PCB ASSY,SHEATH | FAULT RCVR LEO | FN007 |
| 78-8065-2854-9 | | CABLE ASSY,EARTH FRM | | FN008 |
| 78-8051-5854-6 | V | GRND FRAME ASSY,3014 | MDL 573 | FN009 |
| 78-8065-2075-1 | M | PCB ASSY,INTERNAL | ANTENNA LEO | FN010 |
| 78-8065-2063-7 | E | PCB ASSY,CONN BD | 573D | FN011 |
| 78-8093-0027-6 | | CBL ASSY,RCVR,SHORT | | FN012 |
| 26-1010-1314-7 | | CRYSTAL 4.32 MHZ | | FN013 |
| 78-8051-5846-2 | J | DYNACOUPLER ASM,3001 | 3 | FN014 |
| 78-8065-2855-6 | | CABLE ASSY,COUPLER | | FN015 |
| 78-8065-3511-4 | | ANTENNA HOUSING,FRNT | | FN016 |
| 78-8065-3512-2 | | ANTENNA HOUSING,REAR | | FN017 |
| 78-8065-2957-0 | | HANDLE,ANTENNA | | FN018 |
| 78-8065-2879-6 | | GASKET,ANTENNA,LEO | | FN019 |
| 78-8065-2920-8 | D | PCB ASSY,500DL/573DL | PROBE,UPPER | FN020 |
| 78-8065-2922-4 | D | PCB ASSY,500DL/573DL | PROBE LOWER | FN021 |
| 78-8036-4911-6 | | SCR,PAN HD PH SLF TP | 4 X 3/8 | FN022 |
| 26-1008-4267-8 | | SCR,PAN HD SLF TP | 4 X 5/8 | FN023 |
| 26-1002-0813-6 | | MOUNT, CABLE TIE .75 | MPNY-750 NA-D | FN024 |
| 26-1006-4606-1 | | SOCKET, WIREMOUNT-8 | .100 SPACING | FN025 |
| 26-1006-4495-9 | | WIRE, 24AWG TWIST PR | YELLOW-ORNG UL | FN026 |
| 26-1006-1156-0 | | CABLE, COAXIAL, MINI | BELDEN 9264 UL | FN027 |

| 3M PART NUMBER | REV | -----PART NAME------ | --DESCRIPTION-- | --REFERENCE DESIGNATORS |
|---|---|---|---|---|
| 78-8036-6299-4 | | GLUE, HOT MELT | | FN028 |
| 26-1003-6606-6 | | CABLE TIE | PLT1.5M | FN029 |
| 78-8000-7217-1 | | O-RING, RUBBER | .4375 OUTER DIA | FN030 |
| 26-1004-3816-2 | | WASHER, #4 SPECIAL | 5710-266-30 | FN031 |
| 26-1006-7615-9 | | SPACER 1/4 ROUND | .171 ID 1.50 LG | FN032 |
| 26-1002-8277-6 | | GROMMET, 1/8 RUBBER | HHS 2185 | FN035 |
| 78-8065-2826-7 | | BRKT,ANTENNA DETENT | | FN036 |
| 26-1004-0495-8 | | GREASE, DC4 SILICONE | | FN037 |
| 70-0701-0055-0 | | FASTENER, HOOK&LOOP | SJ-3526-3/4 BLK | FN038 |
| 70-0700-9365-6 | | FASTENER,HOOK&LOOP | SJ-3527-3/4 BLK | FN039 |
| 78-8065-2835-8 | | CBL ASSY,DIR CONN | | FN041 |
| 78-8065-2769-9 | * | CBL,DIR CONN,UTILITY | | FN041 |
| 78-8065-3402-6 | | COIL ASSY,ANTENNA | UP/LOW | FN042 |
| 26-1006-5156-6 | | ROD, FERRITE ROUND | 30-61-34000-1 | FN043 |
| 26-1009-6504-0 | | SPACER,1/4 RND NYLN | .115ID X .625LG | FN044 |
| 78-8079-8513-6 | | LBL,ANT,5XXDL SERIES | | FN045 |
| 26-1006-4496-7 | | WIRE, 24AWG TWIST PR | GRAY-WHITE UL | FN046 |
| 78-8036-5343-1 | | WIRE, HOOK-UP 24 AWG | 1429 RED UL | FN047 |
| 78-8040-0732-2 | | WIRE, HOOK-UP 24 AWG | 1429 GREEN UL | FN048 |
| 26-1003-9227-8 | | SCR,PAN HD PH | 4-40 X 7/8 | FN049 |
| 78-8065-1902-7 | L | PCB ASSY,RCVR | DISP/KYBD LEO | FN050 |
| 78-8065-1909-2 | W | PCB ASSY,TRACE RCVR | LEO | FN051 |
| 78-8065-3724-3 | | BRKT,SPKR,MNTG,LIBRA | | FN059 |
| 78-8065-1917-5 | W | PCB ASSY, XMTR | 500D/573D | FN076 |
| 78-8065-1900-1 | K | PCB ASSY, XMTR | DISP/KYBD LEO | FN077 |

# Unique Parts List for Model 500DLE

3M DYNATEL SYSTEMS DIVISION
PARTS LIST, ITEMIZED
3/03/93

| 3M PART NUMBER | REV | -----PART NAME------ | --DESCRIPTION-- | --REFERENCE DESIGNATORS |
|---|---|---|---|---|
| 44-0017-7206-8 | R | ASSY,500DLE UNIQUE | | |
| 78-8065-2425-8 | CU | KIT,COMMON LIBRA | 500D/573D | |
| 09-1009-7200-1 | A | TP,EVM COMM | | |
| 09-1009-8200-1 | B | TP,500D/573D CALIB | | |
| 00-0000-0000-0 | A | TP,573D,REPAIR FINAL | | |
| 00-0000-0000-0 | 05 | SW,CONFIG DWNLD,LEO | VER 02.05 11/11 | |
| 10-0016-4100-1 | G | ASSY,500D/573D RCVR | DRAWING ONLY! | |
| 10-0016-4200-1 | M | ASSY,500D/573D XMTR | DRAWING ONLY! | |
| 10-0016-6700-1 | C | ASSY,500DL/573DL ANT | REF DWG ONLY! | |
| 78-8079-8524-3 | | SHEET,INST,500DLE | | |
| 78-8079-8490-7 | | MAN,LVLI,500DLE TEL | | |
| 78-8079-8491-5 | | MAN,LVLI,500DLE PWR | | |
| 34-7020-0238-6 | | LABEL,CONTENTS | PKG ENGR PN | |
| 34-7028-6740-8 | B | PKG STD,ANTENNA | PKG ENG PN | |
| 70-0023-2311-4 | | TAPE,FILAMENT | PKG ENG PN | |
| 78-8065-3760-7 | | LABEL,SERIAL | 5XXD SERIES | FN001 |
| 78-8065-3738-3 | | OVERLAY,RCVR,LOCATOR | | FN002 |
| 78-8065-3761-5 | | LABEL,NAMEPLATE | LOCATOR | FN003 |
| 78-8065-3736-7 | | OVERLAY,XMTR,LOCATOR | LEO/LIBRA | FN004 |
| 78-8093-0021-9 | | LBL,INST,LOCATOR | | FN005 |
| 78-8093-0060-7 | | LBL,CONN,500DLE | | FN006 |
| 78-8065-2548-7 | D | PCB ASSY, CONN BD | 500D | FN011 |
| 78-8093-0027-6 | | CBL ASSY,RCVR,SHORT | | FN012 |
| 26-1010-1314-7 | | CRYSTAL 4.32 MHZ | | FN013 |
| 78-8051-5846-2 | J | DYNACOUPLER ASM,3001 | 3 | FN014 |
| 78-8065-2855-6 | | CABLE ASSY,COUPLER | | FN015 |
| 78-8065-3511-4 | | ANTENNA HOUSING,FRNT | | FN016 |
| 78-8065-3512-2 | | ANTENNA HOUSING,REAR | | FN017 |
| 78-8065-2957-0 | | HANDLE,ANTENNA | | FN018 |
| 78-8065-2879-6 | | GASKET,ANTENNA,LEO | | FN019 |
| 78-8065-2920-8 | D | PCB ASSY,500DL/573DL | PROBE,UPPER | FN020 |
| 78-8065-2922-4 | D | PCB ASSY,500DL/573DL | PROBE LOWER | FN021 |
| 78-8036-4911-6 | | SCR,PAN HD PH SLF TP | 4 X 3/8 | FN022 |
| 26-1008-4267-8 | | SCR,PAN HD SLF TP | 4 X 5/8 | FN023 |
| 26-1002-0813-6 | | MOUNT, CABLE TIE .75 | MPNY-750 NA-D | FN024 |
| 26-1006-4606-1 | | SOCKET, WIREMOUNT-8 | .100 SPACING | FN025 |
| 26-1006-4495-9 | | WIRE, 24AWG TWIST PR | YELLOW-ORNG UL | FN026 |
| 26-1006-1156-0 | | CABLE, COAXIAL, MINI | BELDEN 9264 UL | FN027 |
| 78-8036-6299-4 | | GLUE, HOT MELT | | FN028 |
| 26-1003-6606-6 | | CABLE TIE | PLT1.5M | FN029 |
| 78-8000-7217-1 | | O-RING, RUBBER | .4375 OUTER DIA | FN030 |
| 26-1004-3816-2 | | WASHER, #4 SPECIAL | 5710-266-30 | FN031 |
| 26-1006-7615-9 | | SPACER 1/4 ROUND | .171 ID 1.50 LG | FN032 |

| 3M PART NUMBER | REV | -----PART NAME------ | --DESCRIPTION-- | --REFERENCE DESIGNATORS |
|---|---|---|---|---|
| 26-1002-8277-6 | | GROMMET, 1/8 RUBBER | HHS 2185 | FN035 |
| 78-8065-2826-7 | | BRKT,ANTENNA DETENT | | FN036 |
| 26-1004-0495-8 | | GREASE, DC4 SILICONE | | FN037 |
| 70-0701-0055-0 | | FASTENER, HOOK&LOOP | SJ-3526-3/4 BLK | FN038 |
| 70-0700-9365-6 | | FASTENER,HOOK&LOOP | SJ-3527-3/4 BLK | FN039 |
| 78-8065-2835-8 | | CBL ASSY,DIR CONN | | FN041 |
| 78-8065-2769-9 | | CBL,DIR CONN,UTILITY | | FN041 |
| 78-8065-3402-6 | | COIL ASSY,ANTENNA | UP/LOW | FN042 |
| 26-1006-5156-6 | | ROD, FERRITE ROUND | 30-61-34000-1 | FN043 |
| 78-8079-8513-6 | | LBL,ANT,5XXDL SERIES | | FN045 |
| 26-1006-4496-7 | | WIRE, 24AWG TWIST PR | GRAY-WHITE UL | FN046 |
| 78-8036-5343-1 | • | WIRE, HOOK-UP 24 AWG | 1429 RED UL | FN047 |
| 78-8040-0732-2 | | WIRE, HOOK-UP 24 AWG | 1429 GREEN UL | FN048 |
| 78-8036-4800-1 | | SCR,PAN HD PH SLF LC | 4-40 X 1/4 | FN049 |
| 78-8065-1902-7 | L | PCB ASSY,RCVR | DISP/KYBD LEO | FN050 |
| 78-8065-1909-2 | W | PCB ASSY,TRACE RCVR | LEO | FN051 |
| 78-8065-3724-3 | | BRKT,SPKR,MNTG,LIBRA | | FN059 |
| 78-8065-1917-5 | W | PCB ASSY, XMTR | 500D/573D | FN076 |
| 78-8065-1900-1 | K | PCB ASSY, XMTR | DISP/KYBD LEO | FN077 |

# Unique Parts List for Model 500DL

3M DYNATEL SYSTEMS DIVISION
PARTS LIST, ITEMIZED
3/03/93

| 3M PART NUMBER | REV | -----PART NAME------ | --DESCRIPTION-- | --REFERENCE DESIGNATORS |
|---|---|---|---|---|
| 44-0017-7156-5 | AA | ASSY,500DL,UNIQUE | | |
| 78-8065-2425-8 | CU | KIT,COMMON LIBRA | 500D/573D | |
| 09-1009-7200-1 | A | TP,EVM COMM | | |
| 09-1009-8200-1 | B | TP,500D/573D CALIB | | |
| 00-0000-0000-0 | A | TP,573D,REPAIR FINAL | | |
| 00-0000-0000-0 | 05 | SW,CONFIG DWNLD,LEO | VER 02.05 11/11 | |
| 10-0016-4100-1 | G | ASSY,500D/573D RCVR | DRAWING ONLY! | |
| 10-0016-4200-1 | M | ASSY,500D/573D XMTR | DRAWING ONLY! | |
| 78-8079-8485-7 | | MAN,LVLI,500DL | | |
| 10-0016-6700-1 | C | ASSY,500DL/573DL ANT | REF DWG ONLY! | |
| 34-7020-0238-6 | | LABEL,CONTENTS | PKG ENGR PN | |
| 34-7028-6740-8 | B | PKG STD,ANTENNA | PKG ENG PN | |
| 70-0023-2311-4 | | TAPE,FILAMENT | PKG ENG PN | |
| 78-8065-3760-7 | | LABEL,SERIAL | 5XXD SERIES | FN001 |
| 78-8065-3738-3 | | OVERLAY,RCVR,LOCATOR | | FN002 |
| 78-8065-3761-5 | | LABEL,NAMEPLATE | LOCATOR | FN003 |
| 78-8065-3736-7 | | OVERLAY,XMTR,LOCATOR | LEO/LIBRA | FN004 |
| 78-8093-0021-9 | | LBL,INST,LOCATOR | | FN005 |
| 78-8093-0060-7 | | LBL,CONN,500DLE | | FN006 |
| 78-8065-2548-7 | D | PCB ASSY, CONN BD | 500D | FN011 |
| 78-8093-0027-6 | | CBL ASSY,RCVR,SHORT | | FN012 |
| 78-8051-5846-2 | J | DYNACOUPLER ASM,3001 | 3 | FN014 |
| 78-8065-2855-6 | | CABLE ASSY,COUPLER | | FN015 |
| 78-8065-3511-4 | | ANTENNA HOUSING,FRNT | | FN016 |
| 78-8065-3512-2 | | ANTENNA HOUSING,REAR | | FN017 |
| 78-8065-2957-0 | | HANDLE,ANTENNA | | FN018 |
| 78-8065-2879-6 | | GASKET,ANTENNA,LEO | | FN019 |
| 78-8065-2920-8 | D | PCB ASSY,500DL/573DL | PROBE,UPPER | FN020 |
| 78-8065-2922-4 | D | PCB ASSY,500DL/573DL | PROBE LOWER | FN021 |
| 78-8036-4911-6 | | SCR,PAN HD PH SLF TP | 4 X 3/8 | FN022 |
| 26-1008-4267-8 | | SCR,PAN HD SLF TP | 4 X 5/8 | FN023 |
| 26-1002-0813-6 | | MOUNT, CABLE TIE .75 | MPNY-750 NA-D | FN024 |
| 26-1006-4606-1 | | SOCKET, WIREMOUNT-8 | .100 SPACING | FN025 |
| 26-1006-4495-9 | | WIRE, 24AWG TWIST PR | YELLOW-ORNG UL | FN026 |
| 26-1006-1156-0 | | CABLE, COAXIAL, MINI | BELDEN 9264 UL | FN027 |
| 78-8036-6299-4 | | GLUE, HOT MELT | | FN028 |
| 26-1003-6606-6 | | CABLE TIE | PLT1.5M | FN029 |
| 78-8000-7217-1 | | O-RING, RUBBER | .4375 OUTER DIA | FN030 |
| 26-1004-3816-2 | | WASHER, #4 SPECIAL | 5710-266-30 | FN031 |
| 26-1006-7615-9 | | SPACER 1/4 ROUND | .171 ID 1.50 LG | FN032 |
| 26-1002-8277-6 | | GROMMET, 1/8 RUBBER | HHS 2185 | FN035 |
| 78-8065-2826-7 | | BRKT,ANTENNA DETENT | | FN036 |
| 26-1004-0495-8 | | GREASE, DC4 SILICONE | | FN037 |

| 3M PART NUMBER | REV | -----PART NAME------ | --DESCRIPTION-- | --REFERENCE DESIGNATORS |
|---|---|---|---|---|
| 70-0701-0055-0 | | FASTENER, HOOK&LOOP | SJ-3526-3/4 BLK | FN038 |
| 70-0700-9365-6 | | FASTENER,HOOK&LOOP | SJ-3527-3/4 BLK | FN039 |
| 78-8065-2835-8 | | CBL ASSY,DIR CONN | | FN041 |
| 78-8065-3402-6 | | COIL ASSY,ANTENNA | UP/LOW | FN042 |
| 26-1006-5156-6 | | ROD, FERRITE ROUND | 30-61-34000-1 | FN043 |
| 78-8079-8513-6 | | LBL,ANT,5XXDL SERIES | | FN045 |
| 26-1006-4496-7 | | WIRE, 24AWG TWIST PR | GRAY-WHITE UL | FN046 |
| 78-8036-5343-1 | | WIRE, HOOK-UP 24 AWG | 1429 RED UL | FN047 |
| 78-8040-0732-2 | | WIRE, HOOK-UP 24 AWG | 1429 GREEN UL | FN048 |
| 78-8036-4800-1 | | SCR,PAN HD PH SLF LC | 4-40 X 1/4 | FN049 |
| 78-8065-1902-7 | L | PCB ASSY,RCVR | DISP/KYBD LEO | FN050 |
| 78-8065-1909-2 | W | PCB ASSY,TRACE RCVR | LEO | FN051 |
| 78-8065-3724-3 | | BRKT,SPKR,MNTG,LIBRA | | FN059 |
| 78-8065-1917-5 | W | PCB ASSY, XMTR | 500D/573D | FN076 |
| 78-8065-1900-1 | K | PCB ASSY, XMTR | DISP/KYBD LEO | FN077 |

# Unique Parts List for Model 2220L

3M DYNATEL SYSTEMS DIVISION
PARTS LIST, ITEMIZED
3/03/93

| 3M PART NUMBER | REV | -----PART NAME------ | --DESCRIPTION-- | --REFERENCE DESIGNATORS |
|---|---|---|---|---|
| 44-0017-7215-9 | T | ASSY,2220L UNIQUE | | |
| 78-8065-2425-8 | CU | KIT,COMMON LIBRA | 500D/573D | |
| 09-1009-7200-1 | A | TP,EVM COMM | | |
| 09-1009-8200-1 | B | TP,500D/573D CALIB | | |
| 00-0000-0000-0 | A | TP,573D,REPAIR FINAL | | |
| 00-0000-0000-0 | 05 | SW,CONFIG DWNLD,LEO | VER 02.05 11/11 | |
| 10-0016-4100-1 | G | ASSY,500D/573D RCVR | DRAWING ONLY! | |
| 10-0016-4200-1 | M | ASSY,500D/573D XMTR | DRAWING ONLY! | |
| 10-0016-6700-1 | C | ASSY,500DL/573DL ANT | REF DWG ONLY! | |
| 78-8079-8494-9 | | MAN,LVLI,2220L | | |
| 34-7020-0238-6 | | LABEL,CONTENTS | PKG ENGR PN | |
| 34-7028-6740-8 | B | PKG STD,ANTENNA | PKG ENG PN | |
| 70-0023-2311-4 | | TAPE,FILAMENT | PKG ENG PN | |
| 78-8065-3760-7 | | LABEL,SERIAL | 5XXD SERIES | FN001 |
| 78-8065-3738-3 | | OVERLAY,RCVR,LOCATOR | | FN002 |
| 78-8065-3761-5 | | LABEL,NAMEPLATE | LOCATOR | FN003 |
| 78-8065-3736-7 | | OVERLAY,XMTR,LOCATOR | LEO/LIBRA | FN004 |
| 78-8093-0021-9 | | LBL,INST,LOCATOR | | FN005 |
| 78-8093-0060-7 | | LBL,CONN,500DLE | | FN006 |
| 78-8065-2075-1 | M | PCB ASSY,INTERNAL | ANTENNA LEO | FN010 |
| 78-8065-2548-7 | D | PCB ASSY, CONN BD | 500D | FN011 |
| 78-8093-0027-6 | | CBL ASSY,RCVR,SHORT | | FN012 |
| 78-8051-5846-2 | J | DYNACOUPLER ASM,3001 | 3 | FN014 |
| 78-8065-2855-6 | | CABLE ASSY,COUPLER | | FN015 |
| 78-8065-3511-4 | | ANTENNA HOUSING,FRNT | | FN016 |
| 78-8065-3512-2 | | ANTENNA HOUSING,REAR | | FN017 |
| 78-8065-2957-0 | | HANDLE,ANTENNA | | FN018 |
| 78-8065-2879-6 | | GASKET,ANTENNA,LEO | | FN019 |
| 78-8065-2920-8 | D | PCB ASSY,500DL/573DL | PROBE,UPPER | FN020 |
| 78-8065-2922-4 | D | PCB ASSY,500DL/573DL | PROBE LOWER | FN021 |
| 78-8036-4911-6 | | SCR,PAN HD PH SLF TP | 4 X 3/8 | FN022 |
| 26-1008-4267-8 | | SCR,PAN HD SLF TP | 4 X 5/8 | FN023 |
| 26-1002-0813-6 | | MOUNT, CABLE TIE .75 | MPNY-750 NA-D | FN024 |
| 26-1006-4606-1 | | SOCKET, WIREMOUNT-8 | .100 SPACING | FN025 |
| 26-1006-4495-9 | | WIRE, 24AWG TWIST PR | YELLOW-ORNG UL | FN026 |
| 26-1006-1156-0 | | CABLE, COAXIAL, MINI | BELDEN 9264 UL | FN027 |
| 78-8036-6299-4 | | GLUE, HOT MELT | | FN028 |
| 26-1003-6606-6 | | CABLE TIE | PLT1.5M | FN029 |
| 78-8000-7217-1 | | O-RING, RUBBER | .4375 OUTER DIA | FN030 |
| 26-1006-7615-9 | | SPACER 1/4 ROUND | .171 ID 1.50 LG | FN032 |
| 26-1002-8277-6 | | GROMMET, 1/8 RUBBER | HHS 2185 | FN035 |
| 78-8065-2826-7 | | BRKT,ANTENNA DETENT | | FN036 |
| 26-1004-0495-8 | | GREASE, DC4 SILICONE | | FN037 |

| 3M PART NUMBER | REV | -----PART NAME------ | --DESCRIPTION-- | --REFERENCE DESIGNATORS |
|---|---|---|---|---|
| 70-0701-0055-0 | | FASTENER, HOOK&LOOP | SJ-3526-3/4 BLK | FN038 |
| 70-0700-9365-6 | | FASTENER,HOOK&LOOP | SJ-3527-3/4 BLK | FN039 |
| 78-8065-2769-9 | | CBL,DIR CONN,UTILITY | | FN041 |
| 78-8065-3402-6 | | COIL ASSY,ANTENNA | UP/LOW | FN042 |
| 26-1006-5156-6 | | ROD, FERRITE ROUND | 30-61-34000-1 | FN043 |
| 78-8079-8513-6 | | LBL,ANT,5XXDL SERIES | | FN045 |
| 26-1006-4496-7 | | WIRE, 24AWG TWIST PR | GRAY-WHITE UL | FN046 |
| 78-8036-5343-1 | | WIRE, HOOK-UP 24 AWG | 1429 RED UL | FN047 |
| 78-8040-0732-2 | | WIRE, HOOK-UP 24 AWG | 1429 GREEN UL | FN048 |
| 78-8036-4800-1 | | SCR,PAN HD PH SLF LC | 4-40 X 1/4 | FN049 |
| 78-8065-1902-7 | L | PCB ASSY,RCVR | DISP/KYBD LEO | FN050 |
| 78-8065-1909-2 | W | PCB ASSY,TRACE RCVR | LEO | FN051 |
| 78-8065-3724-3 | | BRKT,SPKR,MNTG,LIBRA | | FN059 |
| 78-8065-1917-5 | W | PCB ASSY, XMTR | 500D/573D | FN076 |
| 78-8065-1900-1 | K | PCB ASSY, XMTR | DISP/KYBD LEO | FN077 |

# Unique Parts List for Model 4420L

3M DYNATEL SYSTEMS DIVISION
PARTS LIST, ITEMIZED
3/03/93

| 3M PART NUMBER | REV | -----PART NAME------ | --DESCRIPTION-- | --REFERENCE DESIGNATORS |
|---|---|---|---|---|
| 44-0017-7216-7 | U | ASSY,4420L UNIQUE | | |
| 78-8065-2425-8 | CU | KIT,COMMON LIBRA | 500D/573D | |
| 09-1009-7200-1 | A | TP,EVM COMM | | |
| 09-1009-8200-1 | B | TP,500D/573D CALIB | | |
| 00-0000-0000-0 | A | TP,573D,REPAIR FINAL | | |
| 00-0000-0000-0 | 05 | SW,CONFIG DWNLD,LEO | VER 02.05 11/11 | |
| 10-0016-4100-1 | G | ASSY,500D/573D RCVR | DRAWING ONLY! | |
| 10-0016-4200-1 | M | ASSY,500D/573D XMTR | DRAWING ONLY! | |
| 10-0016-6700-1 | C | ASSY,500DL/573DL ANT | REF DWG ONLY! | |
| 78-8079-8495-6 | | MAN,LVLI,4420L | | |
| 34-7020-0238-6 | | LABEL,CONTENTS | PKG ENGR PN | |
| 34-7028-6740-8 | B | PKG STD,ANTENNA | PKG ENG PN | |
| 34-7028-6769-7 | | BOX,SHIPPER | PKG ENG PN | |
| 70-0023-2311-4 | | TAPE,FILAMENT | PKG ENG PN | |
| 78-8065-3760-7 | | LABEL,SERIAL | 5XXD SERIES | FN001 |
| 78-8065-3739-1 | | OVERLAY,RCVR,FAULT | LOCATOR | FN002 |
| 78-8065-3762-3 | | LABEL,NAMEPLATE | FAULT LOCATOR | FN003 |
| 78-8065-3737-5 | | OVERLAY,XMTR,FAULT | LOCATOR | FN004 |
| 78-8093-0022-7 | | LBL,INST,FLT LOCATOR | | FN005 |
| 78-8093-0061-5 | | LBL,CONN,573DLE | | FN006 |
| 78-8065-1980-3 | M | PCB ASSY,SHEATH | FAULT RCVR LEO | FN007 |
| 78-8065-2854-9 | | CABLE ASSY,EARTH FRM | | FN008 |
| 78-8051-5854-6 | V | GRND FRAME ASSY,3014 | MDL 573 | FN009 |
| 78-8065-2075-1 | M | PCB ASSY,INTERNAL | ANTENNA LEO | FN010 |
| 78-8065-2063-7 | E | PCB ASSY,CONN BD | 573D | FN011 |
| 78-8093-0027-6 | | CBL ASSY,RCVR,SHORT | | FN012 |
| 78-8051-5846-2 | J | DYNACOUPLER ASM,3001 | 3 | FN014 |
| 78-8065-2855-6 | | CABLE ASSY,COUPLER | | FN015 |
| 78-8065-3511-4 | | ANTENNA HOUSING,FRNT | | FN016 |
| 78-8065-3512-2 | | ANTENNA HOUSING,REAR | | FN017 |
| 78-8065-2957-0 | | HANDLE,ANTENNA | | FN018 |
| 78-8065-2879-6 | | GASKET,ANTENNA,LEO | | FN019 |
| 78-8065-2920-8 | D | PCB ASSY,500DL/573DL | PROBE,UPPER | FN020 |
| 78-8065-2922-4 | D | PCB ASSY,500DL/573DL | PROBE LOWER | FN021 |
| 78-8036-4911-6 | | SCR,PAN HD PH SLF TP | 4 X 3/8 | FN022 |
| 26-1008-4267-8 | | SCR,PAN HD SLF TP | 4 X 5/8 | FN023 |
| 26-1002-0813-6 | | MOUNT, CABLE TIE .75 | MPNY-750 NA-D | FN024 |
| 26-1006-4606-1 | | SOCKET, WIREMOUNT-8 | .100 SPACING | FN025 |
| 26-1006-4495-9 | | WIRE, 24AWG TWIST PR | YELLOW-ORNG UL | FN026 |
| 26-1006-1156-0 | | CABLE, COAXIAL, MINI | BELDEN 9264 UL | FN027 |
| 78-8036-6299-4 | | GLUE, HOT MELT | | FN028 |
| 26-1003-6606-6 | | CABLE TIE | PLT1.5M | FN029 |
| 78-8000-7217-1 | | O-RING, RUBBER | .4375 OUTER DIA | FN030 |

| 3M PART NUMBER | REV | -----PART NAME------ | --DESCRIPTION-- | --REFERENCE DESIGNATORS |
|---|---|---|---|---|
| 26-1004-3816-2 | | WASHER, #4 SPECIAL | 5710-266-30 | FN031 |
| 26-1006-7615-9 | | SPACER 1/4 ROUND | .171 ID 1.50 LG | FN032 |
| 26-1002-8277-6 | | GROMMET, 1/8 RUBBER | HHS 2185 | FN035 |
| 78-8065-2826-7 | | BRKT,ANTENNA DETENT | | FN036 |
| 26-1004-0495-8 | | GREASE, DC4 SILICONE | | FN037 |
| 70-0701-0055-0 | | FASTENER, HOOK&LOOP | SJ-3526-3/4 BLK | FN038 |
| 70-0700-9365-6 | | FASTENER,HOOK&LOOP | SJ-3527-3/4 BLK | FN039 |
| 78-8065-2769-9 | | CBL,DIR CONN,UTILITY | | FN041 |
| 78-8065-3402-6 | | COIL ASSY,ANTENNA | UP/LOW | FN042 |
| 26-1006-5156-6 | | ROD, FERRITE ROUND | 30-61-34000-1 | FN043 |
| 26-1009-6504-0 | | SPACER,1/4 RND NYLN | .115ID X .625LG | FN044 |
| 78-8079-8513-6 | | LBL,ANT,5XXDL SERIES | | FN045 |
| 26-1006-4496-7 | | WIRE, 24AWG TWIST PR | GRAY-WHITE UL | FN046 |
| 78-8036-5343-1 | | WIRE, HOOK-UP 24 AWG | 1429 RED UL | FN047 |
| 78-8040-0732-2 | | WIRE, HOOK-UP 24 AWG | 1429 GREEN UL | FN048 |
| 26-1003-9227-8 | | SCR,PAN HD PH | 4-40 X 7/8 | FN049 |
| 78-8065-1902-7 | L | PCB ASSY,RCVR | DISP/KYBD LEO | FN050 |
| 78-8065-1909-2 | W | PCB ASSY,TRACE RCVR | LEO | FN051 |
| 78-8065-3724-3 | | BRKT,SPKR,MNTG,LIBRA | | FN059 |
| 78-8065-1917-5 | W | PCB ASSY, XMTR | 500D/573D | FN076 |
| 78-8065-1900-1 | K | PCB ASSY, XMTR | DISP/KYBD LEO | FN077 |

DSB 1/19/95 INFO FOR - 3M PARTS - 800-426-8688 PRESS 22 (MENU

95 ~~78-8036-5997-4~~ 78 80-3659-974 CHARGE JK. (BAT.) - 1
~~26-1006-1947-2~~ 2610-0619-402 DIRECT CONNECT JK. (OUTPUT) - 2

CAUTION
CHANGES HAVE BEEN MADE
ON THIS PAGE.
SEE ISSUE SHEET.

# Parts List for Antenna Assy.

3M DYNATEL SYSTEMS DIVISION
PARTS LIST, ITEMIZED
3/03/93

| 3M PART NUMBER | REV | -----PART NAME------ | --DESCRIPTION-- | --REFERENCE DESIGNATORS |
|---|---|---|---|---|
| 44-0017-7239-9 | E | ASSY,ANTENNA | LOW FREQUENCY | |
| 10-0016-6700-1 | C | ASSY,500DL/573DL ANT | REF DWG ONLY! | |
| 34-7020-0238-6 | | LABEL,CONTENTS | PKG ENGR PN | |
| 34-7028-6662-4 | | BOX,CORRUGATED | PKG ENG PN | |
| 34-7028-6740-8 | B | PKG STD,ANTENNA | PKG ENG PN | |
| 70-0023-2311-4 | | TAPE,FILAMENT | PKG ENG PN | |
| 78-8065-3760-7 | | LABEL,SERIAL | 5XXD SERIES | FN001 |
| 78-8093-0027-6 | | CBL ASSY,RCVR,SHORT | | FN012 |
| 78-8065-3511-4 | | ANTENNA HOUSING,FRNT | | FN016 |
| 78-8065-3512-2 | | ANTENNA HOUSING,REAR | | FN017 |
| 78-8065-2957-0 | | HANDLE,ANTENNA | | FN018 |
| 78-8065-2879-6 | | GASKET,ANTENNA,LEO | | FN019 |
| 78-8065-2920-8 | D | PCB ASSY,500DL/573DL | PROBE,UPPER | FN020 |
| 78-8065-2922-4 | D | PCB ASSY,500DL/573DL | PROBE LOWER | FN021 |
| 78-8036-4911-6 | | SCR,PAN HD PH SLF TP | 4 X 3/8 | FN022 |
| 26-1008-4267-8 | | SCR,PAN HD SLF TP | 4 X 5/8 | FN023 |
| 26-1002-0813-6 | | MOUNT, CABLE TIE .75 | MPNY-750 NA-D | FN024 |
| 26-1006-4606-1 | | SOCKET, WIREMOUNT-8 | .100 SPACING | FN025 |
| 26-1006-4495-9 | | WIRE, 24AWG TWIST PR | YELLOW-ORNG UL | FN026 |
| 26-1006-1156-0 | | CABLE, COAXIAL, MINI | BELDEN 9264 UL | FN027 |
| 78-8036-6299-4 | | GLUE, HOT MELT | | FN028 |
| 26-1003-6606-6 | | CABLE TIE | PLT1.5M | FN029 |
| 78-8000-7217-1 | | O-RING, RUBBER | .4375 OUTER DIA | FN030 |
| 26-1004-3816-2 | | WASHER, #4 SPECIAL | 5710-266-30 | FN031 |
| 26-1006-7615-9 | | SPACER 1/4 ROUND | .171 ID 1.50 LG | FN032 |
| 26-1002-8277-6 | | GROMMET, 1/8 RUBBER | HHS 2185 | FN035 |
| 78-8065-2826-7 | | BRKT,ANTENNA DETENT | | FN036 |
| 26-1004-0495-8 | | GREASE, DC4 SILICONE | | FN037 |
| 70-0701-0055-0 | | FASTENER, HOOK&LOOP | SJ-3526-3/4 BLK | FN038 |
| 70-0700-9365-6 | | FASTENER,HOOK&LOOP | SJ-3527-3/4 BLK | FN039 |
| 78-8065-3402-6 | | COIL ASSY,ANTENNA | UP/LOW | FN042 |
| 26-1006-5156-6 | | ROD, FERRITE ROUND | 30-61-34000-1 | FN043 |
| 78-8079-8513-6 | | LBL,ANT,5XXDL SERIES | | FN045 |
| 26-1006-4496-7 | | WIRE, 24AWG TWIST PR | GRAY-WHITE UL | FN046 |
| 78-8036-5343-1 | | WIRE, HOOK-UP 24 AWG | 1429 RED UL | FN047 |
| 78-8040-0732-2 | | WIRE, HOOK-UP 24 AWG | 1429 GREEN UL | FN048 |

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# Calibration

## 1. INTRODUCTION

**1.1** The transmitter, receiver, and antenna have variable components that are set when they are manufactured. Since the unit is microprocessor controlled, it is tolerant of poor adjustments. For your information, though, the following is a list of the adjustable components, what they affect, and how to adjust them.

## 2. RECEIVER CALIBRATION

### A. Low Pass Filter

**2.1** R165 in the low pass filter affects the input signal balance to the first mixer. An imbalance is only perceptible when the receiver is trying to receive a very low frequency such as the 50 or 60 Hz power frequencies. At this time the local oscillator and the input frequencies are very close together and imbalance images may pass to the IF amplifier. It will be necessary to adjust R165 if any component in the preamplifier, the low pass filter, or the first mixer is changed.

**2.2** To adjust R165, attach the external antenna to the receiver. Find a power cord of an operating piece of test equipment or appliance such as a lamp. Wrap the cord around the antenna so that it will pick up the 50 or 60 Hz field from the cord. There must be current flowing in the cord. Turn the receiver on and press the PEAK-NULL-DIFF key to select the peak mode. Press the FREQ key to choose the PWR frequency. Press the GAIN ADJUST KEY and then press the VOLUME key to adjust the speaker volume. Listen to the audio from the speaker and adjust R165 for a null (diminished or no sound).

### B. First Mixer

**2.3** T3 is a tuned transformer in the output of the first mixer. The bandwidth of this transformer is very broad and no adjustment of T3 is necessary.

**2.4** L5 is a variable inductor at the input of the IF amplifier circuit that controls the bandwidth of the IF amplifier.

**2.5** To adjust L5, use the transmitter to supply a signal to the receiver. Set the transmitter near the receiver (less than 10 feet) and turn it on. Press the TRACE key and then the FREQ1 key to select any frequency. Make sure there is nothing plugged into the output jack. This will activate the induction antenna of the transmitter. Attach the external antenna to the receiver. Turn the receiver on and press the PEAK-NULL-DIFF key to select the peak mode. Press the FREQ key to choose the same frequency as the transmitter. Press the GAIN ADJUST key and then press the VOLUME key to allow the speaker to function. Listen to the audio from the speaker. It may be necessary to adjust the position of the antenna with respect to the transmitter to obtain satisfactory audio from the speaker. Adjust L5 for a peak. Repeat on all transmitter frequencies.

### C. Local Oscillator

**2.6** If T5 is out of adjustment, U3 may not be able to control the frequency of the oscillator via diodes CR1 and CR2. You can determine this by monitoring the signal (SYNFB) at J6 pin 4. Use an oscilloscope and look for either positive or negative pulses. This indicates that the oscillator is not running at the correct frequency. Adjust T5 for no pulses.

### D. Internal Antenna

**2.7** Only models 573DL and 573DLE have an internal antenna. C1 is a variable capacitor used to balance the leakage capacitance of transistor Q1 when it is off. Q1 is off and the antenna is disabled when the signal (IP) is low. Unless the effect of the capacitance is nullified, the leakage capacitance will allow high frequencies to be coupled into the receiver even though the transistor is off.

**2.8** To adjust C1, use the transmitter to supply a signal to the receiver. Set the transmitter near the receiver (less than 10 feet) and turn it on. Press the TRACE key and then the FREQ1 key to select the highest frequency. Make sure there is nothing plugged into the output jack. This will activate the induction antenna of the transmitter. Turn the receiver on and press the PEAK-NULL-DIFF key to select the peak mode. Press the FREQ key to choose the same frequency as the transmitter. Press the GAIN ADJUST KEY and then press the VOLUME key to adjust speaker volume. Listen to the audio from the speaker and make sure the receiver is picking up the signal from the transmitter. It may be necessary to adjust the position of the receiver with respect to the transmitter to obtain a satisfactory signal. Without moving the receiver, plug a dummy phone plug (one with no wires attached) into the coupler/probe jack on the front of the receiver. This will disable the internal antenna. Press the GAIN ADJUST key to increase the receiver sensitivity. Adjust C1 for a null in the audio response. Press the GAIN ADJUST key again and adjust C1 for a null.

## 3. TRANSMITTER CALIBRATION

### A. Pulse-Width Modulator

**3.1** U27 is a phase–lock loop and R29 sets the initial frequency of the voltage-controlled oscillator (VCO). The frequency of this oscillator ultimately determines the duty cycle of the class-D output amplifier.

**3.2** To adjust R29, plug the direct connect transmitter cable into the output jack and clip a 100 Kilohms resistor between the red and black clips. To sample the VCO frequency, use either test point 22 (1024 KHz) or test point 23 (512 KHz). At these test points, it is only necessary to observe that the frequency is steady (the phase-lock loop is locked). You can use either a frequency counter or an oscilloscope. Between test point 30 (the output of the class-D amplifier) and ground, attach a DC voltmeter. Turn the transmitter on and press the OHMS key. Adjust R29 so that the DC voltmeter at TP30 reads +1.5 VDC when the phase-lock loop is locked.

## 4. EXTERNAL ANTENNA CALIBRATION

**4.1** Because the individual antennas react with each other, calibration of the external antenna requires a special fixture that places each individual antenna in a known field. Since this fixture is not available, you should not attempt field calibration of the external antenna.

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**3M Telecom Systems Group**

6801 River Place Blvd.
Austin, Texas 78726-9000

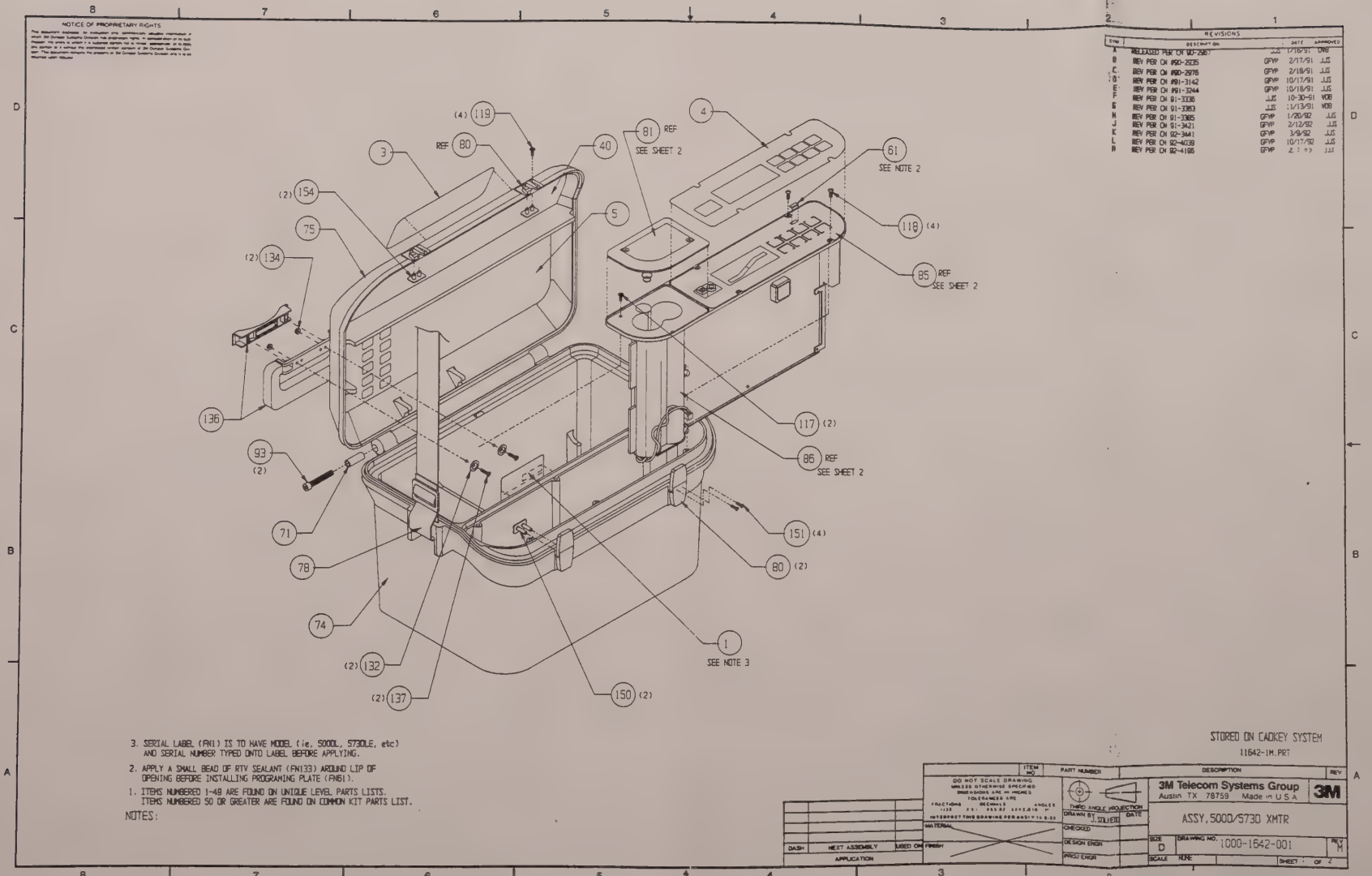
NOTICE OF PROPRIETARY RIGHTS
REVISIONS
3. SERIAL LABEL (FN1) IS TO HAVE MODEL (ie, 5000L, 5730LE, etc) AND SERIAL NUMBER TYPED ONTO LABEL BEFORE APPLYING.
2. APPLY A SMALL BEAD OF RTV SEALANT (FN133) AROUND LIP OF OPENING BEFORE INSTALLING PROGRAMING PLATE (FN61).
1. ITEMS NUMBERED 1-49 ARE FOUND ON UNIQUE LEVEL PARTS LISTS. ITEMS NUMBERED 50 OR GREATER ARE FOUND ON COMMON KIT PARTS LIST.
NOTES:
SEE NOTE 2
SEE NOTE 3
SEE SHEET 2
STORED ON CADKEY SYSTEM
11642-1M.PRT
3M Telecom Systems Group
Austin TX 78759 Made in U.S.A.
ASSY, 5000/5730 XMTR
1000-1642-001

Figure 5 Transmitter Assembly

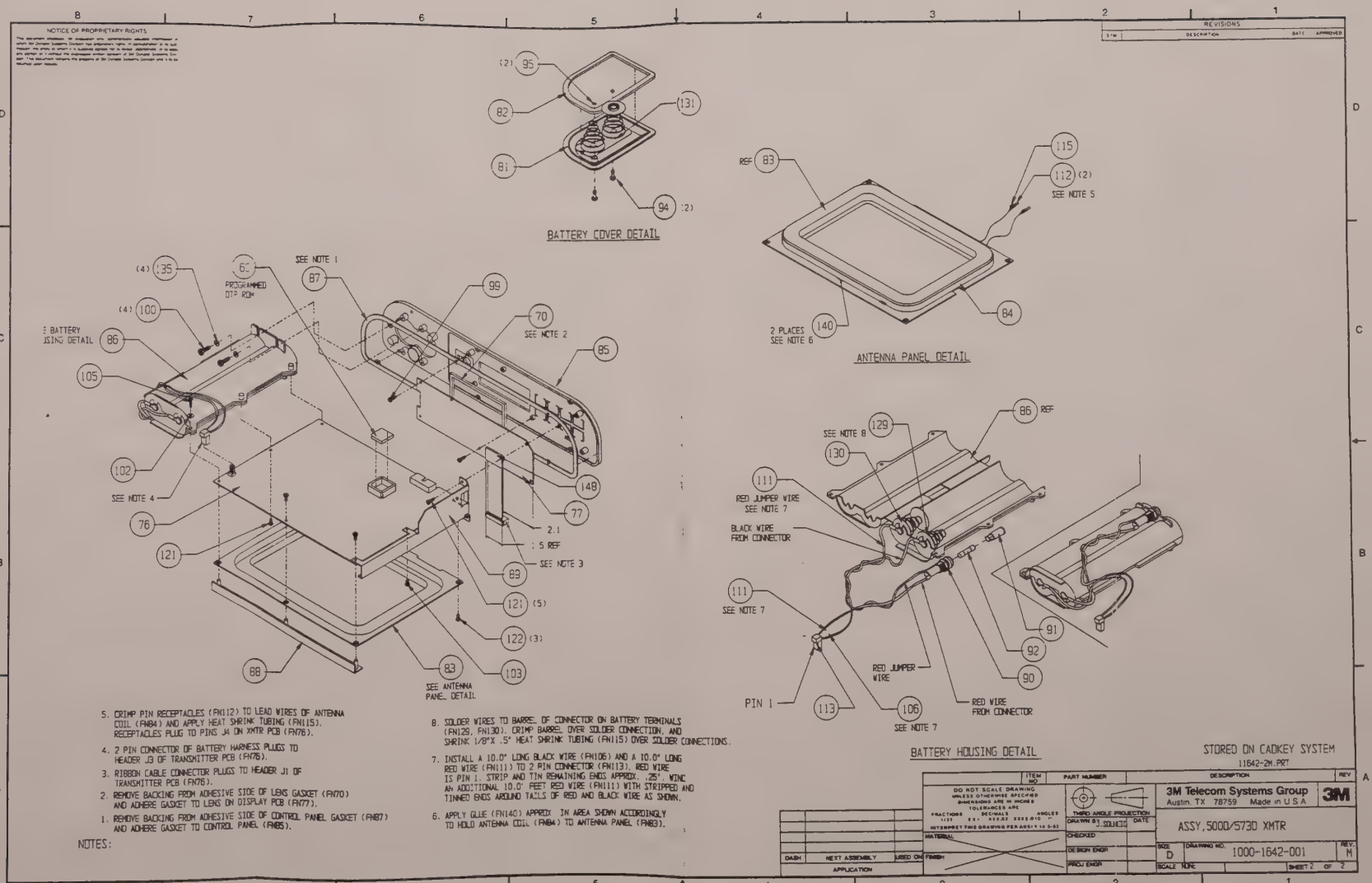
BATTERY COVER DETAIL
ANTENNA PANEL DETAIL
BATTERY HOUSING DETAIL
STORED ON CADKEY SYSTEM
11642-2M.PRT
3M Telecom Systems Group
Austin, TX 78759 Made in U.S.A.
ASSY,5000/5730 XMTR
1000-1642-001
NOTES:
5. CRIMP PIN RECEPTACLES (FN112) TO LEAD WIRES OF ANTENNA COIL (FN84) AND APPLY HEAT SHRINK TUBING (FN115). RECEPTACLES PLUG TO PINS J4 ON XMTR PCB (FN76).
4. 2 PIN CONNECTOR OF BATTERY HARNESS PLUGS TO HEADER J3 OF TRANSMITTER PCB (FN76).
3. RIBBON CABLE CONNECTOR PLUGS TO HEADER J1 OF TRANSMITTER PCB (FN76).
2. REMOVE BACKING FROM ADHESIVE SIDE OF LENS GASKET (FN70) AND ADHERE GASKET TO LENS ON DISPLAY PCB (FN77).
1. REMOVE BACKING FROM ADHESIVE SIDE OF CONTROL PANEL GASKET (FN87) AND ADHERE GASKET TO CONTROL PANEL (FN85).
8. SOLDER WIRES TO BARREL OF CONNECTOR ON BATTERY TERMINALS (FN129, FN130). CRIMP BARREL OVER SOLDER CONNECTION, AND SHRINK 1/8"X .5" HEAT SHRINK TUBING (FN115) OVER SOLDER CONNECTIONS.
7. INSTALL A 10.0" LONG BLACK WIRE (FN106) AND A 10.0" LONG RED WIRE (FN111) TO 2 PIN CONNECTOR (FN113). RED WIRE IS PIN 1. STRIP AND TIN REMAINING ENDS APPROX. .25". WIND AN ADDITIONAL 10.0" FEET RED WIRE (FN111) WITH STRIPPED AND TINNED ENDS AROUND TAILS OF RED AND BLACK WIRE AS SHOWN.
6. APPLY GLUE (FN140) APPROX. IN AREA SHOWN ACCORDINGLY TO HOLD ANTENNA COIL (FN84) TO ANTENNA PANEL (FN83).

**Figure 6 Control Panel Assembly**

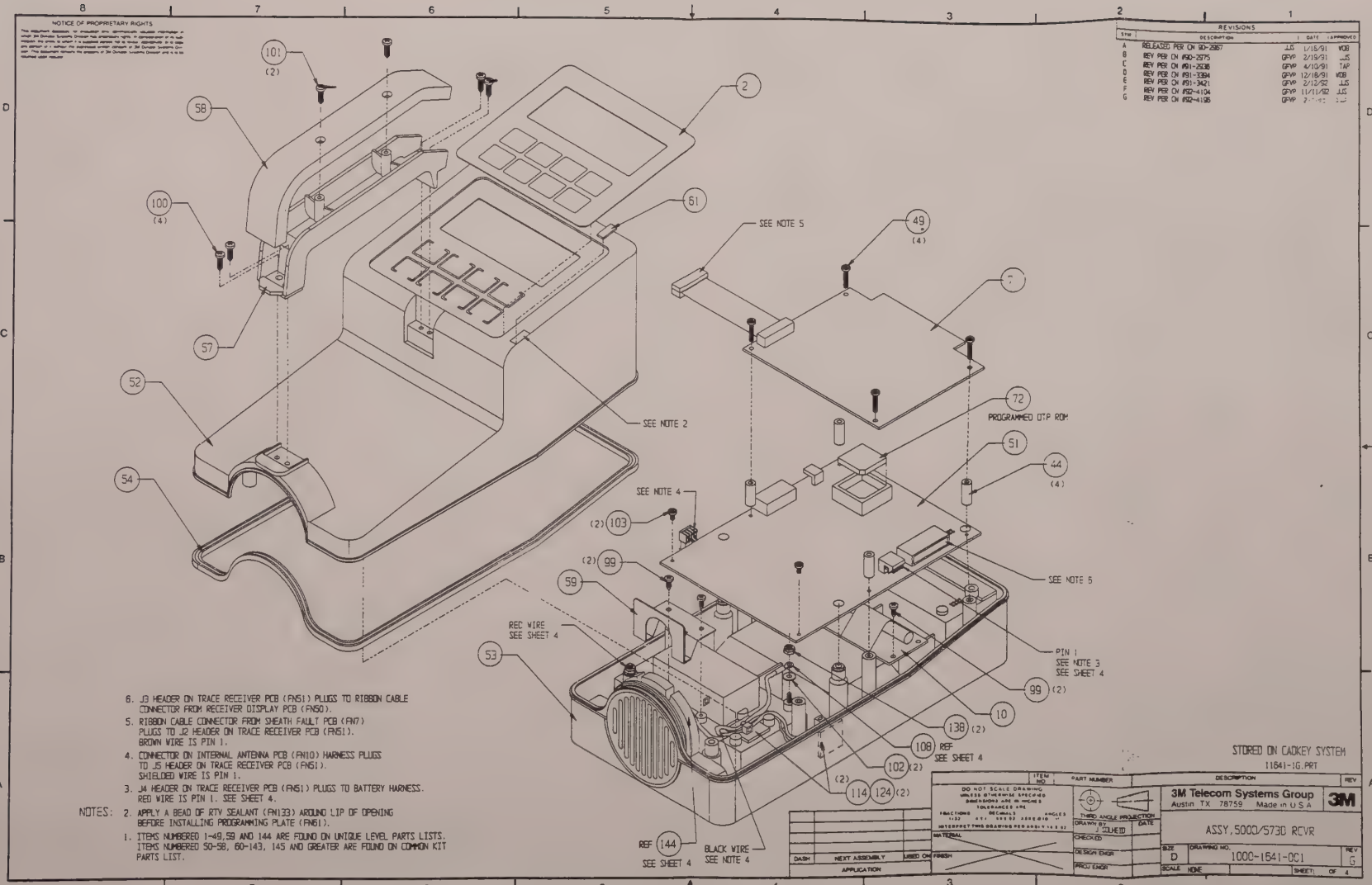
NOTICE OF PROPRIETARY RIGHTS
REVISIONS
STD DESCRIPTION DATE APPROVED
A RELEASED PER CN 90-2967 1/15/91 WDB
B REV PER CN #92-2575 2/19/91
C REV PER CN #91-2608 4/10/91 TAP
D REV PER CN #91-3894 12/18/91 WDB
E REV PER CN #91-3421 2/12/92
F REV PER CN #92-4104 11/11/92
G REV PER CN #92-4126
101 (2)
58
100 (4)
57
52
54
2
61
SEE NOTE 5
49 (4)
7
72
PROGRAMMED OTP ROM
51
44 (4)
SEE NOTE 2
SEE NOTE 4
(2) 103
(2) 99
59
53
RED WIRE SEE SHEET 4
SEE NOTE 6
PIN 1 SEE NOTE 3 SEE SHEET 4
99 (2)
10
138 (2)
108 REF SEE SHEET 4
102 (2)
(2) 114 124 (2)
REF 144 SEE SHEET 4
BLACK WIRE SEE NOTE 4
6. J3 HEADER ON TRACE RECEIVER PCB (FA51) PLUGS TO RIBBON CABLE CONNECTOR FROM RECEIVER DISPLAY PCB (FA50).
5. RIBBON CABLE CONNECTOR FROM SHEATH FAULT PCB (FA7) PLUGS TO J2 HEADER ON TRACE RECEIVER PCB (FA51). BROWN WIRE IS PIN 1.
4. CONNECTOR ON INTERNAL ANTENNA PCB (FA10) HARNESS PLUGS TO J5 HEADER ON TRACE RECEIVER PCB (FA51). SHIELDED WIRE IS PIN 1.
3. J4 HEADER ON TRACE RECEIVER PCB (FA51) PLUGS TO BATTERY HARNESS. RED WIRE IS PIN 1. SEE SHEET 4.
NOTES:
2. APPLY A BEAD OF RTV SEALANT (FA133) AROUND LIP OF OPENING BEFORE INSTALLING PROGRAMMING PLATE (FA61).
1. ITEMS NUMBERED 1-49,59 AND 144 ARE FOUND ON UNIQUE LEVEL PARTS LISTS. ITEMS NUMBERED 50-58, 60-143, 145 AND GREATER ARE FOUND ON COMMON KIT PARTS LIST.
STORED ON CADKEY SYSTEM
11641-1G.PRT
ITEM NO. PART NUMBER DESCRIPTION REV
3M Telecom Systems Group
Austin TX 78759 Made in U.S.A.
3M
ASSY,5000/5730 RCVR
SIZE D DRAWING NO. 1000-1641-001 REV G
SCALE NONE SHEET 1 OF 4

**Figure 7 Receiver Assembly 1 of 4**

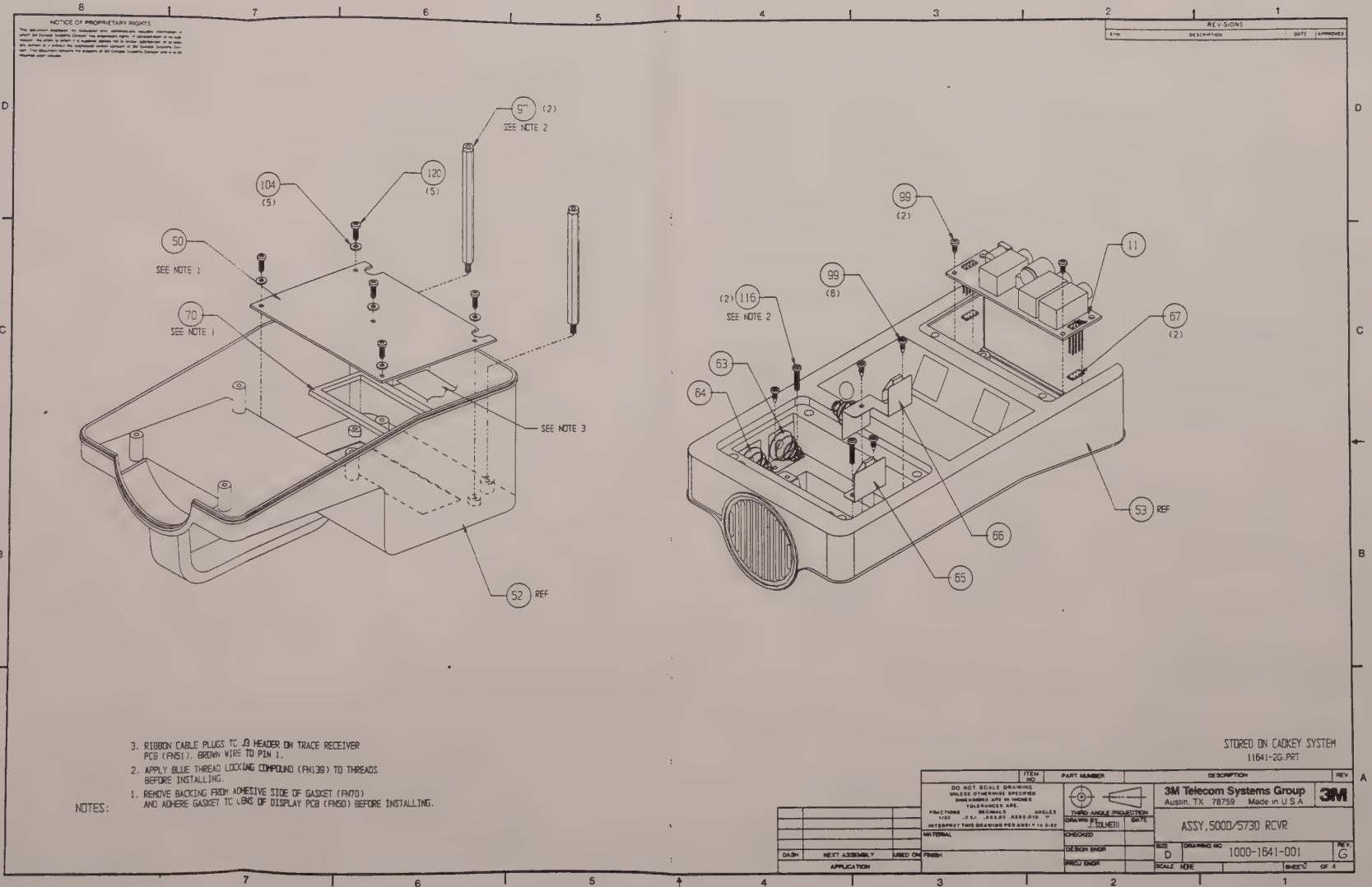


**Figure 8 Receiver Assembly 2 of 4**

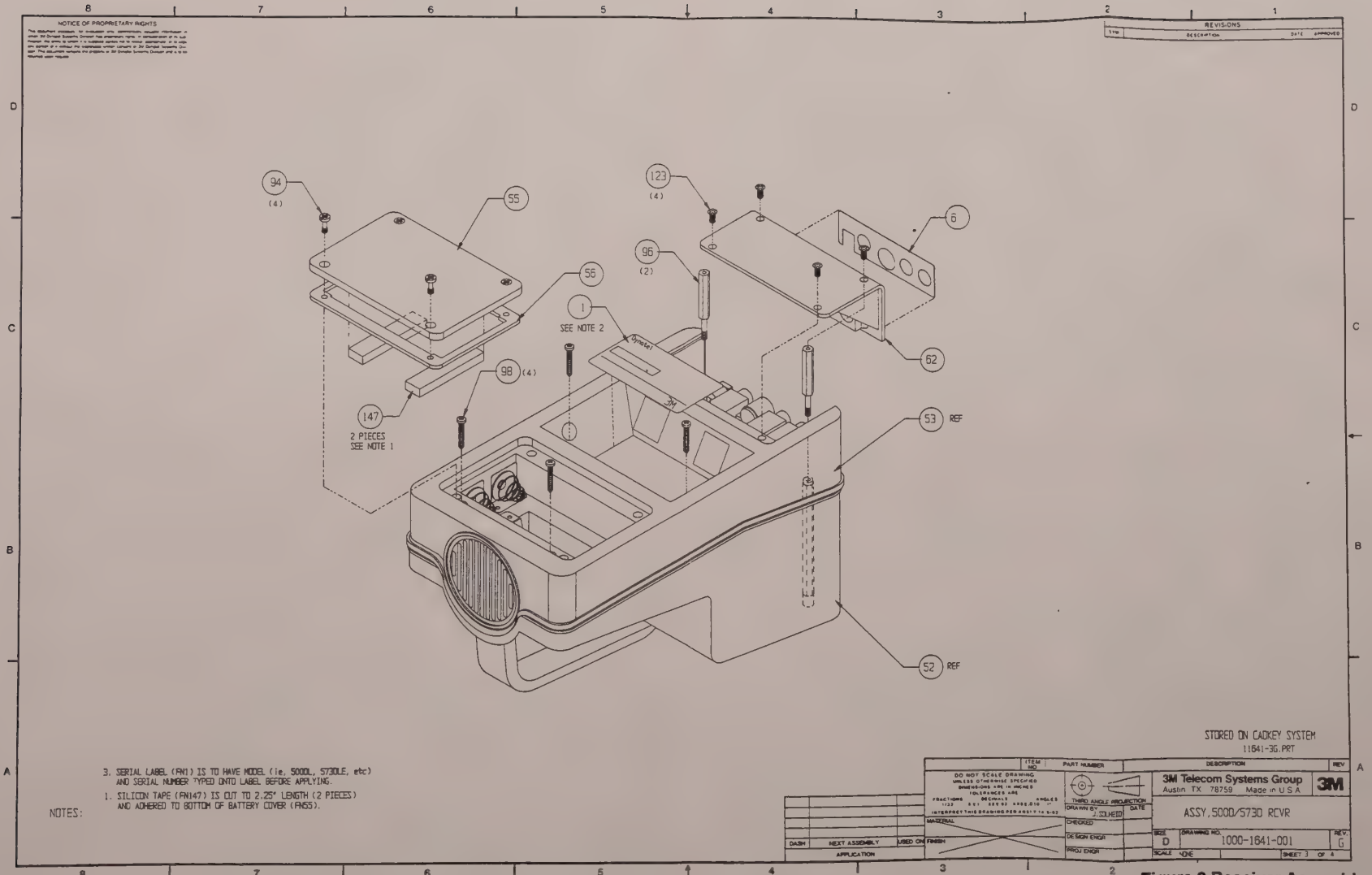


**Figure 9 Receiver Assembly 3 of 4**

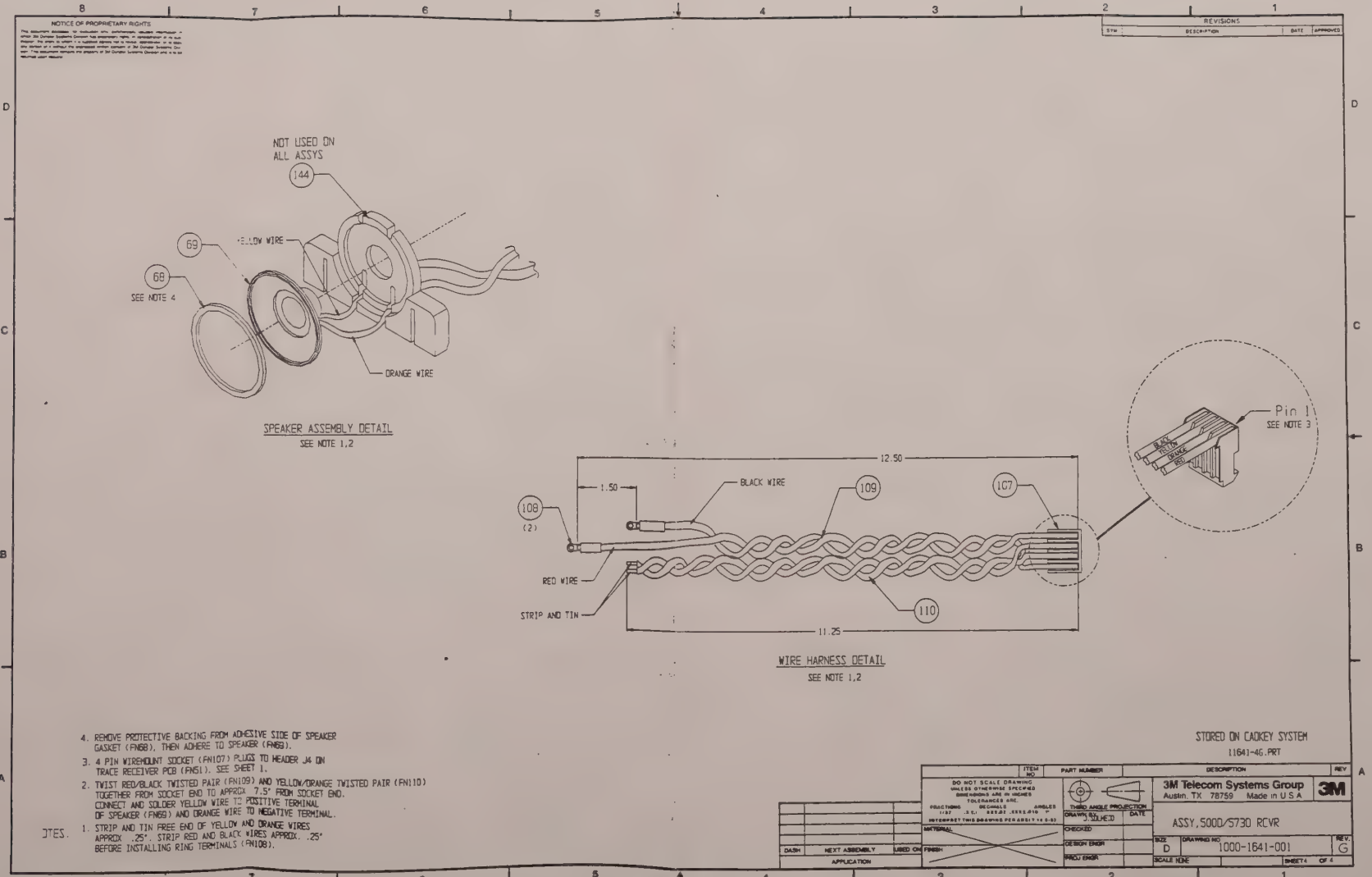
NOTICE OF PROPRIETARY RIGHTS
REVISIONS
NOT USED ON ALL ASSYS
144
69
YELLOW WIRE
68
SEE NOTE 4
ORANGE WIRE
SPEAKER ASSEMBLY DETAIL
SEE NOTE 1,2
12.50
1.50
BLACK WIRE
108
(2)
109
107
RED WIRE
STRIP AND TIN
110
11.25
WIRE HARNESS DETAIL
SEE NOTE 1,2
Pin 1
SEE NOTE 3
BLACK
RED/BLK
ORANGE
RED
4. REMOVE PROTECTIVE BACKING FROM ADHESIVE SIDE OF SPEAKER GASKET (FN68), THEN ADHERE TO SPEAKER (FN69).
3. 4 PIN WIREMOUNT SOCKET (FN107) PLUGS TO HEADER J4 ON TRACE RECEIVER PCB (FN51). SEE SHEET 1.
2. TWIST RED/BLACK TWISTED PAIR (FN109) AND YELLOW/ORANGE TWISTED PAIR (FN110) TOGETHER FROM SOCKET END TO APPROX 7.5" FROM SOCKET END. CONNECT AND SOLDER YELLOW WIRE TO POSITIVE TERMINAL OF SPEAKER (FN69) AND ORANGE WIRE TO NEGATIVE TERMINAL.
NOTES. 1. STRIP AND TIN FREE END OF YELLOW AND ORANGE WIRES APPROX .25". STRIP RED AND BLACK WIRES APPROX. .25" BEFORE INSTALLING RING TERMINALS (FN108).
STORED ON CADKEY SYSTEM
11641-46.PRT
DO NOT SCALE DRAWING
3M Telecom Systems Group
Austin, TX 78759 Made in U.S.A
3M
ASSY,5000/5730 RCVR
SIZE D
1000-1641-001
REV. G
SHEET 4 OF 4

**Figure 10 Receiver Assembly 4 of 4**

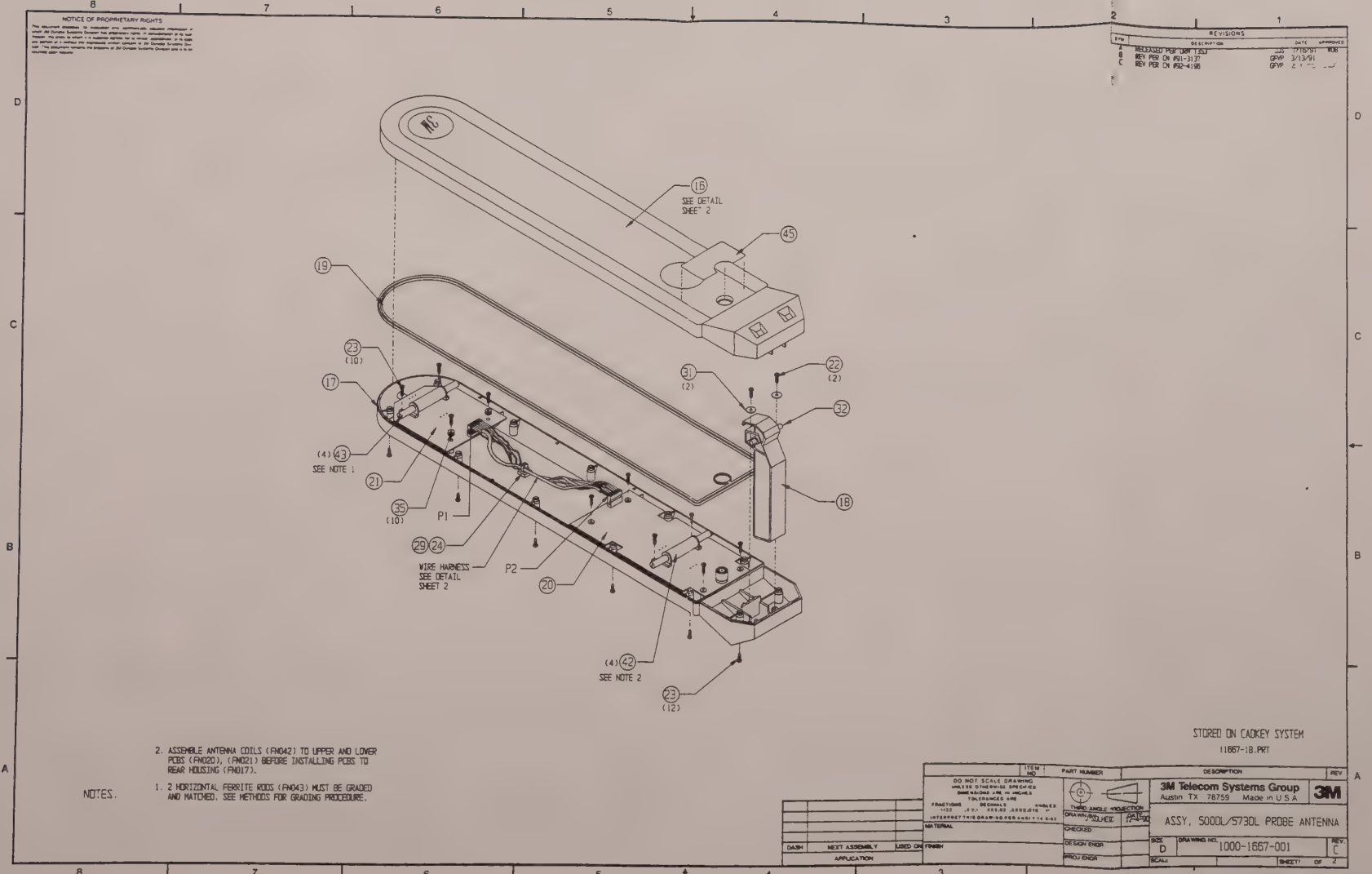
NOTICE OF PROPRIETARY RIGHTS
REVISIONS
SEE DETAIL SHEET 2
WIRE HARNESS SEE DETAIL SHEET 2
SEE NOTE 1
SEE NOTE 2
P1
P2
NOTES.
1. 2 HORIZONTAL FERRITE RODS (FA043) MUST BE GRADED AND MATCHED. SEE METHODS FOR GRADING PROCEDURE.
2. ASSEMBLE ANTENNA COILS (FA042) TO UPPER AND LOWER PCBS (FA020), (FA021) BEFORE INSTALLING PCBS TO REAR HOUSING (FA017).
STORED ON CADKEY SYSTEM
11667-1B.PRT
3M Telecom Systems Group
Austin TX 78759 Made in U.S.A.
ASSY, 5000L/5730L PROBE ANTENNA
1000-1667-001

**Figure 11 External Antenna Assembly 1 of 2**

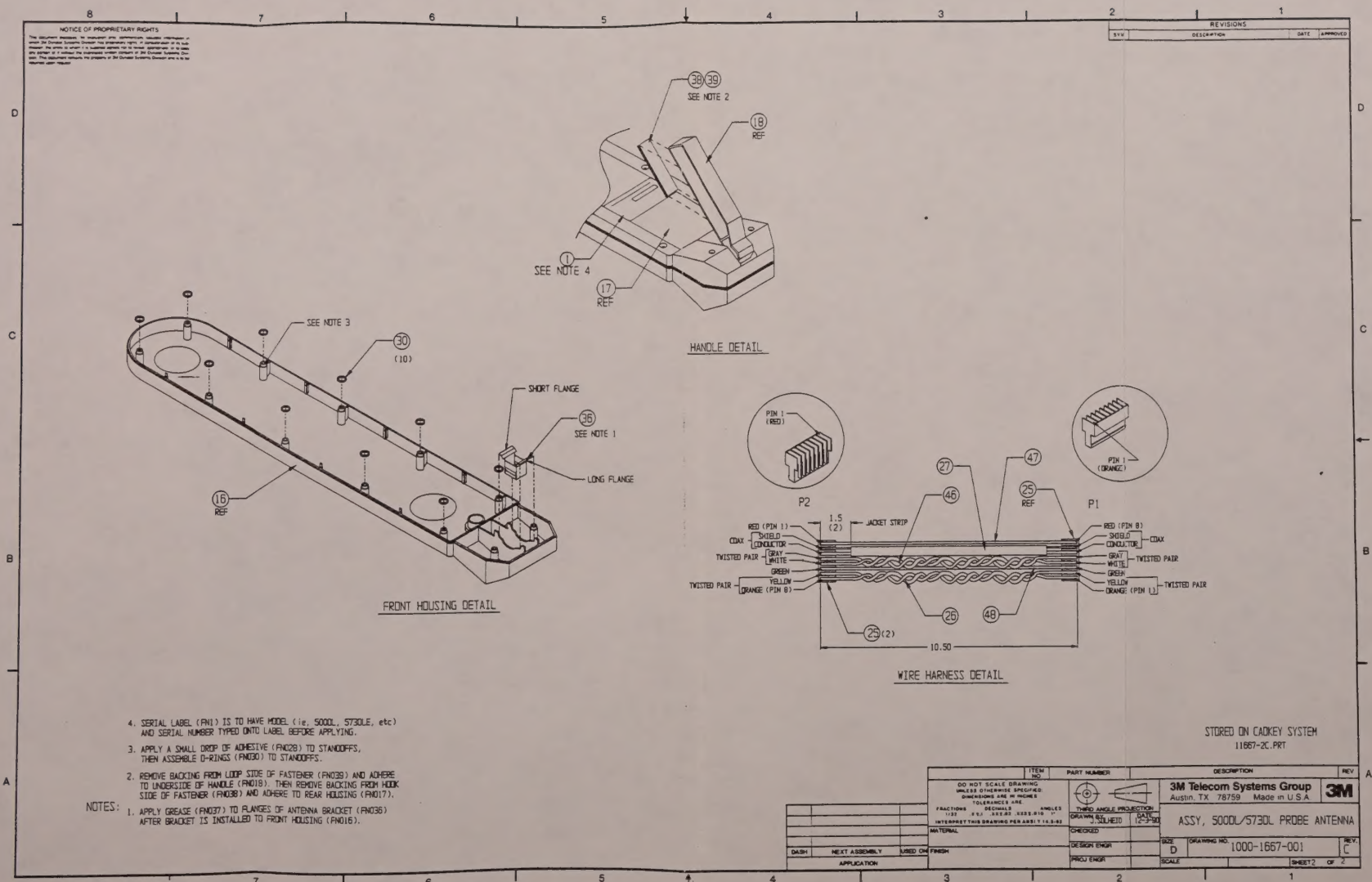


**Figure 12 External Antenna Assembly 2 of 2**

ACCO USA
WHEELING, ILLINOIS 60090
# 25979
MADE IN USA
0 50505 25979 3
EXECUTIVE RED/ROUGE EX/ROJO EJECUTIVO

MP MASTER
MA31879